

Sustainable development in a megacity

Assessing a shared public bicycle scheme in Mexico City



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Abstract

Expanding urbanization, urban challenges and pathways towards sustainable urban development are topics that have received increased attention during the last decade, especially in view of the growing focus on mitigation and adaptation to climate change. Moreover, fossil fuel consumption related to transport has been identified as a significant source of greenhouse gas emissions in urban areas, and as such greening of urban mobilities has emerged as a priority in many cities.

This thesis is based on fieldwork undertaken in Mexico City during the months of June and July 2018. The empirical data obtained is supplemented with a theoretical framework including concepts such as sustainable development, Campbell's trinity of planning, the system of automobility and urban inequality, as well as a review of literature related to bike-sharing schemes in general and selected case studies. The main aim of this research have been to explore the concepts of sustainable development and mobility in a megacity, by assessing a shared public bicycle scheme in Mexico City and analysing its performance and impacts. The research topics has been addressed through the following research question: *In what ways does Ecobici contribute to a more sustainable urban development?*

The study approaches these issues by identifying the users, their main motivation for using Ecobici and the most prominent constraints and opportunities the scheme faces. Furthermore, it explores the relation between intentioned and actual use. The findings indicate that most of the users are men with higher education. Ecobici is mainly used for transport purposes and the majority uses the scheme with high frequency and in combination with other means of transport. A significant number of users substitutes non-public means of transport with bike-sharing. Convenience aspects emerge as the main motivation for using the bikes and is also listed as the most prominent advantage, while maintenance and the scheme's design are aspects that call for improvement. Among non-users the most listed barriers for using Ecobici are security issues, lack of infrastructure, accessibility and vial culture. The aims of the scheme and its outcomes do to a large extent correspond.

The results from the study indicate that Ecobici and bike-sharing schemes in general brings about several benefits, both on an individual and societal level, but that they fail to address the aspect of social equity given that it seems to reach only certain segment of society. In other words, bike-sharing does not fully contribute to sustainable urban development and further research are needed in order to outline adequate measures to ensure more equal access.

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Almost exactly one year have passed since I packed my bags and headed off to Mexico City to convey fieldwork and almost two since I stepped into the first information meeting at the master program, with only a vague idea about what was awaiting me. Working with this project has felt overwhelming at times, and it has been a quite a bumpy journey with a lot of frustration and ups and downs. However, the experience of doing fieldwork alone in a foreign country, the small victories along the road and the sense of achievement when I managed to overcome challenges and accomplish smaller and bigger tasks throughout the process has been a driving force for seeing the project through. As such, it feels even more satisfactory to finally be able to say, “I made it!”

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List of abbreviations

BCH: Barclays Cycle Hire

BRT: Bus Rapid Transit

CEMCA: Center for Mexican and Central American Studies

CIA: Central Intelligence Agency

CDMX: Mexico City

DF: Distrito Federal (Federal District)

ITDP: Institute for Transportation and Development Policy

INEGI: National Institute of Statistics and Geography

MDG: Millennium Development Goals

NSD: Norwegian Center for Research Data

OECD: Organisation for Economic Co-operation and Development

SEDEMA: The Ministry of Environment

SDG: Sustainable Development Goals

SEMOVI: The Ministry of Mobility

UNAM: National Autonomous University of Mexico

1. Introduction

In recent years, the world has faced a surge in urban challenges related to population growth, e.g. increasing levels of air pollution, urban sprawl, water shortage, waste issues, informal housing and social inequity. Particularly in the so-called global south, where the inflow of people from rural areas in search of a job and “a better life” makes the population growth pace much faster than in the case of the global north, a trend that is expected to continue (UN, 2014). Moreover, many cities of the global south often struggle with other, fundamental problems such as political unrest, unstable economies, corruption and weak democracies, which makes them more vulnerable when it comes to tackling urban challenges.

According to the United Nations (2014), more than half of the world’s population live in cities and this share is expected to increase to 2/3 by 2050. Rapid urbanization poses serious strains on local resources, ecosystems and infrastructure, but at the same time, the concentration of larger groups of consumers generates resource and energy efficiencies through economies of scale. Hence, cities can be considered to represent both the problem and the solution (Tonkiss, 2013, p. 113).

The management of urban areas has emerged as one of the 21st century’s biggest development challenges and succeeding to create sustainable cities is considered crucial to ensure sustainable development (UN, 2014). Furthermore, climate change is threatening life on earth as we know it, and this calls for urgent and profound transformations of all societies in order to mitigate and adapt to its consequences. Therefore, it is necessary to convey research in cities in both the global north and south to enhance the understanding of the complex connections between universal challenges and local conditions. Both to find possible solutions to current problems and to develop and implement adequate and efficient measures that secures a sustainable urban development path in the years to come.

1.1 Selection of topic and field area

Several of the challenges mentioned above are related to urban mobility. Lack of sufficient and effective public transport systems for the cities' increasing population has led to severe problems related to traffic congestion, air pollution and insufficient infrastructure in urban areas. I will claim that a public transport system that is perceived as unattractive (i.e. saturated, unreliable, expensive, slow), in combination with the cars continuous position as a symbol of status and autonomy, are important causes to these problems.

Furthermore, emissions from fossil fuel consumption related to transport, together with electricity production, energy-use in residential and commercial buildings, industrial production and waste, are identified as the main sources of greenhouse gas emissions in urban areas. In 2005, transport represented almost a quarter of the global CO₂ emissions from fossil fuel combustion and even if transport's share of greenhouse gas emissions has traditionally been low in developing countries, it is increasing faster than other sectors. This rapid increment is related to urban sprawl and modal shifts stemming from the increased access and aspiration to individual motorized transport among the growing middle-class in developing cities (UN-Habitat, 2011, p. 100).

Hence, making public transport greener, more attractive and accessible should be a highly prioritized task in all cities as part of ensuring sustainable urban development. One such measure for making public transport more attractive and sustainable that has experienced increased popularity in recent years, are shared public biking schemes.

1.1.1 Bike-sharing

“The principle of bikesharing is simple. Individuals use bicycles on an “as-needed” basis without the costs and responsibilities of bike ownership.” (Shaheen et al., 2010).

The concept of bike-sharing has come a long way from its first appearance in Amsterdam in the 1960s. These first generation of shared bike schemes consisted of a set of free bikes on the disposal of the community to use and return in any location. Due to problems with theft and vandalism, a 2nd generation of systems based on coin-deposits and docking stations where developed in the early 90s, before the smart card based 3rd generation systems began to appear in the late 90s. The 3rd generation schemes' improved design, security and user-friendliness enabled the transition of bike-sharing from being an urban experiment to a mainstream public transport option. Today, the technological solutions are further developed in what is known as

4th generation schemes, which includes electric bikes, portable solar-powered docking-stations, dock-less systems and mobile apps picturing availability in real-time (Midgley, 2011).

Despite the course of development throughout over fifty years of bike-sharing history, its' essence remains the same: the possibility of picking up a bike in one location and returning it in another, enabling point-to-point, human powered transportation (ITDP, 2014). Today there are more than 1600 bike-share systems around the globe, with new systems adding to the statistics every year (Bhardwaj and Gal, 2018). According to Shaheen et al. (2010), bike-sharing system provides users with short-term bicycle access and provides an environmentally friendly option of public transport. The benefits of bike-sharing are not only personal, but also provides positive environmental, social and transport-related effects. For instance, it is often viewed as a green solution to the so-called "last-mile" problem, referring to a (short) distance between home, workplace or access points to public transport that are perceived as too large to walk. As such, bike-sharing might serve as a bridge between existing means of transport as well as for incentivizing multimodal transportation. Its ultimate goal is to be regarded as an integrated part of the local transport system.

Shaheen et al. (2010, p. 2) lists the following potential benefits of bike sharing; increased mobility options, reduced costs due to modal shifts, lower cost frame for implementation and operation than other means of transport, reduction of congestion and fuel consumption, increased attractiveness of public transport, health benefits and creation of environmental awareness. Additionally, bike-sharing can reduce the number of short trips done by car and consequently improve air quality, the timeline is short and hence it is possible to plan and implement a bike-sharing scheme within one political term, which shortens the horizon for achieving public benefits compared to other means of transport. Moreover, the modern and hip image bike-sharing represents, might improve the overall status of cycling and enhance cycling culture and cycling's modal share in a city. Finally, bike-sharing can contribute to lift and "green" the city's image, encourage local investments related to the development of systems and products and foster a positive feedback-effect on the development of biking infrastructure which benefits all cyclists. (ITDP, 2014, p. 14-16).

As seen, these systems offer multiple advantages such as its relatively short planning and implementation horizon, low cost, flexibility and high grade of accessibility through pricing mechanisms. Bike-sharing can function as an independent mean of transport, but also be integrated into established networks of public transport, e.g. as a solution to the "last mile problem". It might bring multiple benefits to both users and the environment through reduction

in congestion and air pollution, health benefits and enhancement of cycling culture in general, among others. Based on the reflections outlined above, I have chosen to undertake research on bike-sharing, using Mexico City's shared public scheme Ecobici as case.

1.1.2 Mexico City

After considering several possible field areas for my master project, I finally decided upon Mexico City. The reason for this is two-fold: On one hand, I wanted to make use of my knowledge and experiences stemming from a BA in Spanish and Latin American Studies and extensive travels in the region. On the other hand, I find the city's history, culture and dynamic very fascinating and with its status as a megalopolis, I think it might contribute with interesting experiences that other cities, regardless of size or geographic location, can learn from. Moreover, among the Latin-American countries Mexico is the country I know the most after living there for several periods, which could be an advantage considering potential cultural and linguistic barriers that might arise during the fieldwork. At the same time, I do not have a personal connection to Mexico City and hence I avoid it getting too close or personal.

Mexico City is today one of the world's biggest cities due to exponential population growth during the last century which can be related to a big population growth in Mexico generally, around 1900 there were about 15 million people in Mexico (Durand, 2004) compared to today's 126 million (World Bank, 2019). That said, it is also a consequence of the inflow of people from rural areas and other cities attracted to the capital, due to the vision of greater possibilities to get a job. With such a considerable population growth in short time, it is evident that the city faces multiple challenges and one of the most prominent in Mexico City is related to mobility issues.

According to OECD (2015, p.26), former car-oriented policies have led to severe air pollution and congestion, as well as lower productivity and reduced life-quality in the city. However, in current years the city has begun a transition away from policies favouring vehicles, towards policies enhancing multimodal forms of transport. Amongst the measures pointing to an enhanced focus on non-motorized transport, is the implementation of the shared public bicycle scheme Ecobici.

1.1.3 Ecobici

Ecobici is a shared biking scheme started in February 2010 by the local government of what was earlier known as Distrito Federal, D.F., today Mexico City, within the frame of “Estrategia de movilidad en bicicleta” (strategy for mobility on a bike), developed by SEDEMA (the Ministry of Environment) in collaboration with UNAM (National Autonomous University of Mexico) and Gehl architects. This strategy was published in 2007 as part of the “Plan Verde”-initiative, a policy instrument of medium term which within the framework of the “Programa de Desarrollo General (2007-2012)” (General development program) established the strategies and actions of the government of the D.F. to guide Mexico City towards a sustainable urban development (Gobierno D.F., 2011).

Despite Ecobici’s nine years of existence there is not much available academic research on its performance and influence on mobility in Mexico City, and even less so on its contribution to sustainable urban development. This situation is in line with the experiences from other bike-sharing schemes; even if bike-sharing has been around for almost 60 years the research field is quite limited and lacks substantial empirical evidence related to both its aims, performance and outcomes. SEDEMA in collaboration with CEMCA (Center for Mexican and Central American Studies) has elaborated two reports on Ecobici based on user surveys, published in 2012 and 2015. The aim of these surveys was to identify the aspect that makes people use Ecobici, to enhance the use of the scheme as well as biking in general. Furthermore, it measured motivations for modal shifts (López 2012, 2015). The reports present the data material without analyzing it much further and has to my knowledge resulted in two published articles.

I will to some extent address questions explored in the two existing reports, mainly for two reasons. Primarily because only the data material from the 2012-report is methodologically comparable to my research and since Ecobici has gone through several phases of expansion since 2012, and has experienced a great increase in registered users, I find it necessary to gather new data. Secondly, using some of the same parameters enables me to compare key findings and see if there have been any significant changes. Furthermore, I find that there still are many unaddressed questions related to the aims of implementing a shared bicycle scheme and its contributions to improve urban transport and enhance sustainable urban development.

1.2 Research question

Using Ecobici as a case enabled me to combine my interest for urban geography in a Latin American context, a region which unfortunately comes across as somewhat forgotten, both in the field of academic research and what general media coverage concerns, with an approach to one of the most complex challenges of the mega-cities of the global south; mobility. At the same time, issues related to mobility and sustainable urban development have transfer value to any city in the world, regardless of size or geographical location. Hence, in this project I will approach issues such as traffic congestion, overload of the public transport network and social inequity through one specific measure that possibly represents part of the solution to these challenges.

The aim of this research project is to study sustainable urban development and mobility in a megacity through the lens of the shared public bicycle scheme Ecobici, by seeking to understand its aims, usage pattern and impact. To be able to address these issues I have elaborated the following research question, with three sub-questions:

In what ways does Ecobici contribute to a more sustainable urban development?

- *RQI: Who are the users and what are their main motivations for using Ecobici?*
- *RQII: How attractive is the scheme for the city's inhabitants and what are the most prominent constraints and opportunities?*
- *RQIII: What is the relation between intentioned and actual use?*

1.3 Delimitation of field area

Due to the impossibility of undertaking fieldwork in Mexico City as one entity, I decided to delimit my research area to two neighbourhoods. I chose Roma Norte as a starting point, given that it is among the first neighbourhoods where Ecobici was installed and that it represents one of the areas that produces and attracts most trips and has among the highest number of registered users (López, 2015). Furthermore, my knowledge of the area in terms of being an attractive place for both living and visiting, a fairly safe place to move for a solo female traveler and its central location, influenced my decision. The second neighbourhood I chose was Centro, mainly for having a different (lower) socio-economic status and a different mix of businesses and residential characteristics than Roma Norte. Furthermore, both neighbourhoods are easily accessible by multiple means of transport and located in relatively short distance from one another (~ 3 km).

2. Theoretical approach and literature review

In this chapter, I will explore the theoretical approach that forms the backdrop for this research project. More specifically, I will define key concepts and make a revision of relevant literature that will contribute to place my research topic in a broader context and hopefully inform my findings. The chapter has an inverted pyramid structure where I start by outlining the broader theoretical framework, before I narrow it down to give a more thematically and geographically specific theoretic outlook. Furthermore, the chapter is organized in three thematic sections. In the first one, I will explore the concept sustainable development in more general terms, before outlining Campbell's trinity of sustainability in cities. Secondly, I will define the concepts of mobility and inequality as well as explore Banister's sustainable mobility paradigm and Urry's automobility paradigm. Thirdly, I will review literature related to shared bicycle schemes, both in general terms and from selected case studies.

2.1 Sustainable development

It is easy to perceive sustainability and sustainable development as buzzwords stemming from the current public debate. Both scholars and the press are covering the topic with increasing intensity, both influencing and influenced by the rising concern among the average person for a (more) sustainable resource management, production, consumption and development, in order to ensure a sustainable future. Sustainable development is very often framed as being a solution to the big challenges of our time such as climate change, contamination of the Worlds' oceans with plastic, waste management issues, environmental degradation, mass extinction of species, eradication of rainforest and extreme weather conditions caused by global warming, just to name a few examples. But what does sustainability and sustainable development actually mean, and what does it imply for our lifestyles, both as individuals and as societies?

Although facing a considerable surge in importance and popularity the last couple of years, both in terms of academic research and media coverage, sustainability and sustainable development are by no means new concepts. As far back as 1987, the Brundtland Commission published the well-known report "Our common future" where they launched the concept sustainable development, understood as: "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCDE, 1987, p. 41). Furthermore, the report clarifies that this definition contains two key concepts: "Needs", that should be understood as the world's non-privileged crucial needs and thus strongly prioritised,

and the view of technological and socio-organizational constraints to the environment's capacity to face present and future needs. The report presents a diagnostic of the world with symptoms and causes and outlines a strategy that includes context, goals, pathways, challenges and requirements towards sustainable development. The report concludes that the strategy seeks to promote balance among humans and between humans and nature (WCDE, 1987, p. 57).

During the Earth Summit in Rio de Janeiro in 1992, the UN launched "Agenda 21" which was an extensive action-plan seeking to build global cooperation for sustainable development with the aim to enhance quality of human life while conserving the environment. In 2000, all UN member states adopted the Millennium Declaration, which led to the development of the Millennium Development Goals (MDGs). Two years later the "Declaration on Sustainable Development and the Plan of Implementation", based on the two former, was approved. In 2012, the outcome document "The Future We Want" was implemented, leading to the decision of developing a new set of development goals, but this time including "sustainable" in the title. Simultaneously the UN High-level Political Forum on Sustainable Development was established (UN, 2019)

Currently, the UN's 17 Sustainable Development Goals (SDGs), adopted in 2015 as part of the 2030 Agenda for Sustainable Development, receives a lot of attention. Among these goals we find SDG #11 "Sustainable Cities and Communities", which is directly linked to the urban development discussion, but in a broader sense most of the goals can be said to be linked to desirable pathways for city development to a lesser or greater extent. (UN, 2019).

2.1.1 Sustainable urban development

The importance of the cities' role in the context of sustainable development was assessed already in the report "Our common future", but where Jorge Hardoy (referred to in WCDE, 1987, p. 200) stated that "(..) I don't see any solution for the Third World City", and the report focused more on the numerous problems the cities represents than the possible solutions, I try to pursue a slightly more nuanced and optimistic approach. There are certainly many challenges in what he refers to as "the third world cities", some of them outlined in the introduction chapter, but that is also the case for the so-called industrialized cities. That said, cities are also hubs for research and innovation and should consequently be part of the solution, and not just that: The cities should in line with UN-Habitat's recommendations (2011) take on the role as a driving-

force in the process of both developing and adopting solutions and pathways towards sustainable development.

The emphasis on sustainable urban development has gained momentum throughout the last decade, and city planners and politicians alike talk about sustainable ways of living, zero-emission buildings, green mobilities, smart cities and sustainable waste-management. However, how can city planners manoeuvre in this jungle of green, smart and sustainable proposals and the constraints posed by interests, political will, legislations and current infrastructure? To approach this challenge I want to go back to Campbell's classic article "Green Cities, Growing Cities, Just Cities?: Urban Planning and the Contradictions of Sustainable Development" and in continuation present his classic triangle of conflicting goals for planning and its implications for the development of sustainable cities.

2.1.2 Campbell's trinity of urban planning

At the very core of Campbell's (1996) approach to planning, lies the idea of three conflicting, but at times complementary interests that fight for the planner's attention in different clashes motivated by ideology and academic stance. He advocates that we need to rethink the definition of sustainability as it often is based on antiquated, romantic ideas of a pre-industrial past where man and nature co-existed in absolute harmony, in order to make it relevant and useful. It will not be possible to undo the industrialization process and the current urban infrastructure, which without doubt has taken its toll on the natural environment; rather we should seek to build a sustainable future through innovation and negotiation of conflicting interests.

The planner's triangle consists of the three corners economic growth, environmental protection and social justice. At the centre lies sustainable development that should be pursued as the ultimate goal for planners. That said, Campbell (1996) underlines that it is not possible to reach the goal without facing and solving the conflicts present across the triangle. Furthermore, the triangle does not only showcase the conflicts but also the overlapping interests. Consequently, it represents a window of opportunity for the planner to extend his role from being only a conflict moderator to also operating as a stimulator for collaboration between formerly distanced groups.



Figure 1: Campbell's triangle of conflicting goals for planners. Source: *Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of Sustainable Development*. (Campbell, 1996)

The three corners of the triangle represent three divergent planning perspectives, which again leads to different views of the city and its competitors. The planner who places himself in the economic corner considers the city a centre for production, consumption and innovation, in constant rivalry with other cities over new markets and industries. The environmental planning approach views the city as an entity that consumes resources and produces waste, and constantly competes with and threatens nature. The last planning perspective represented in the triangle is the social justice approach, which views the city as a struggle for resources, services and opportunities, where the competition is of internal character.

Campbell argues that part of the conflicts stems from the problems that arises when communication of interests is “lost in translation”. Economists, politicians and environmentalists do not speak the same language, but even if we managed to make them meet on common ground, their conflicting interests represent an obstacle for reaching the centre of the triangle.

Based on these three (conflicting) approaches to planning, Campbell (1996) continues outlining the most prominent conflicts present in the triangle: 1) The property conflict which comprises economic growth versus equity, 2) The resource conflict which concerns economic versus

ecological utility and 3) The development conflict related to social equity and environmental preservation. The two former could be considered the classic conflicts where economic growth is weighed against equity or environment, while the latter comes from the difficulty of ensuring both interests at once.

This leads us back to the complementarity aspect of the triangle and the possibilities for collaboration between the conflicting priorities. The main aim of the triangle is to integrate the environmental and the social viewpoints. This transdisciplinary approach is not easy, as it requires an acceptance of the view of nature as a social construction, without dismissing the dimension of nature as a concept with value in its own right but should definitely be a priority among planners.

So how can the planner reach the centre of the triangle, sustainable development? Given the concepts widespread acceptance, even among generally conflicting entities and stakeholders, a possible pitfall is that *everybody* embraces sustainability, but *nobody* actually takes action. On the other hand, the shift in sustainability's position from being one of several variables to becoming a hegemonic idea might ensure its inclusion in any future development path. In a more practical sense, Campbell (1996) raises the question concerning the usefulness of the sustainability concept for planners. He argues that its holistic character and long-term horizon might hamper the concepts' effectiveness in terms of both establishing concrete, short-term actions and the possibility to measure the achievement rate. In addition, planners need to address two key aspects that remains confusing: The pathways towards and outcomes of sustainability.

Given the challenges and opportunities outlined above, the planner should pursue a two-fold role: He should act as a mediator for conflicts but at the same time promote innovative and concrete solutions for institutional, technical and infrastructural development towards sustainability. In the mediation of conflict, Campbell (1996) underlines that the planner is more likely to succeed if he deals with a defined and not an ideological conflict. Secondly, he reiterates the importance of the planner as a bridge-builder and translator between the different interest groups, facilitating mutual understanding and a common ground. He also presents other process-oriented paths that includes political decision-making, favouring the inclusion of a broader group, and market-driven strategies where divergent interests is attempted solved with pricing. The latter might work for resource conflicts (economic growth vs. environmental protection) but tends to undermine the social justice perspective. Central in all the above-

mentioned approaches, stands the planner's role as a facilitator for the *process* of decision-making, and not for determining the outcome.

Transferring the visions of the planner's triangle to my research question, implies that Ecobici, in order to be considered an enhancer of sustainable urban development in Mexico City, needs to have addressed the property conflict, the resource conflict and the development conflict and thus has ensured both economic growth, environmental protection and social justice. I find it difficult to imagine that the bike-sharing scheme has not contributed to environmental protection or that it should have had any negative influence on the economy, but I am eager to explore if it has had any effect on issues related to social equity.

2.2 Mobility

In line with Cresswell assertions (2010, p. 19), it is necessary to define mobility as an entangled trinity consisting of movement, representation and practice, before moving on to study the politics of mobility. The concept of physical movement can be considered the basic component of any mobility, including people, ideas and things, as it is what produces the possibility of moving. Movement can be measured, mapped and used to create models and scenarios, and this positivist approach is used within a number of fields. The second component is representation, which tackles how mobilities are represented through different narratives and in different contexts and which meaning creation this leads to. Mobilities have been represented as freedom, adventure, a virtue of necessity, as a right and dysfunctional, just to name a few. Finally, we have the concept of practice, which includes both undertaking common practices such as biking and driving, but also the social dimension of the practice as embodied and habitual.

According to Söderström (2017, p. 197) there has been a "mobility turn" in social sciences, which in line with the relational turn in urban theory emphasizes flows, movements and connections. Hence, the focal point should be mobilities in plural, studying a wide range of interdependent mobilities rather than one particular mobility. In terms of my research project I find this approach interesting as I want to explore if and how the bicycle scheme fits into the broader mobility regime, how different mobilities are connected and functions together and which potential gaps the Ecobici-program seeks to fill.

2.2.1 System of automobility

In the 20th Century, one particular innovation became the ultimate symbol of modernity, progress and individual freedom – the car. The introduction of the automobile dominated and shaped urban development for almost hundred years and has left deep social, economic, environmental and infrastructural traces on cities all over the globe. Furthermore, it has caused a path-dependency that complicates the transition to other mobility regimes and pathways towards a sustainable urban development on different scales.

According to Urry (2004), automobility can be understood as a self-organizing, non-linear system consisting of cars, car-drivers, roads, fuel suppliers and a range of new objects, technologies and signs that has spread globally. The key is not the car itself, but the flowing interconnections between the following six factors that in the virtue of their combination achieves and reproduce the automobility system's dominating character: The ultimate manufactured object and industry, developed by the leading forces of 20th century capitalism. The most influential item of individual consumption after housing, which furthermore possess inherent symbolic values. An extremely imposing structure constituted by its social and technical connections with other industries. Subordination of other means of mobilities on a global scale. Cultural dominance that includes discourses concerning what creates "the good life" and finally, its position as the primary cause of environmental resource consumption.

Urry (2004, p. 3) argues that the system of automobility emerged because of a path-dependent structure, established in the final part of the 19th Century. Once societies and economies were tied to the 'steel-and petroleum car', this generated huge incomes for those involved in any part of the value-chain. Moreover, even if it was not necessary nor inevitable, social life started to evolve around the automobile and its implications - an irreversible pattern that ensured the self-expansion of the car and has proven very hard to break out of.

Despite the automobile system's century-long dominance, the result of a "by accident"-establishment followed by an institutional lock-in process transforming it into a social structure, Urry (2004) outlines a scenario where a disruption caused by so-called tipping points can enable a paradigm shift. Tipping points involves three important assumptions; events or phenomenon are contagious, small factors can cause big effects and change needs to happen abruptly when systems shift. In his view there are six technical-economic, policy and social transformations that because of their powerful interdependency might tip the current automobility system into a new, post-car system, including: New fuel systems for cars, e.g. overnight everyone wants to

drive an electric car. New car-construction materials, giving room for more compact and lighter cars. Smart-card technology that can facilitate a single payment option for any mean of transport. Car-sharing and car-pooling schemes that enhance de-privatization of car ownership. Shifts in transport policy from predict and provide to “new realism”, which involves measures aimed at changing consumer behaviour and developing new mobility alternatives. Finally, the increasingly intertwined relationship between communication technology, internet and transport enables new hybrid mobilities, but might also reduce the need for travelling e.g. by using videoconference equipment instead of travelling to a meeting.

None of these transformations are able to tip the automobile system alone, but an emergence of their interlinkages in a certain order might provoke a shift. He finally depicts the post-car society as a “..mixed flow of slow-moving semi-public micro-cars, bikes, many hybrid vehicles, pedestrians and mass transport integrated into a mobility of physical and virtual access” (Urry, 2004, p. 11).

2.2.2 Sustainable mobility paradigm

Banister (2008) argues that two main principles form the fundament of traditional transport planning. The first principle is that travel is considered a necessary evil and hence not an activity performed out of pleasure, and the second that people try to minimize their time consumption and costs related to transport. The result is the car-dependency that many cities of today faces, alongside the decreased attractiveness of transport modes such as walking, cycling and public transport. According to Noland and Polak quoted in Banister (2008, p. 74): “People and businesses are already concerned with knowing how much time it should take to travel to their destination with a reasonable degree of certainty. It is the reliability of the system that is crucial”.

The sustainable mobility approach requires actions to reduce the need to travel (less trips), to encourage modal shift, to reduce trip lengths and to enhance efficiency in the transport system. Furthermore, public acceptability is core to successful implementation of radical change and regarded as essential for political change. One example is that congestion now is widely accepted as a significant constraint on the life quality of individuals, but also as a drawback for business efficiency. Finally, the quality of the neighbourhoods is central to sustainable mobility and involving “the people” in transport planning is key (Banister, 2008).

I will argue that the most relevant feature of the sustainable mobility approach in connection to my research is the modal shift away from car as the central mobility alternative to a new transport hierarchy, promoting walking, biking and public transport. This can be achieved for example through the implementation of shared bicycle schemes, by improving the urban infrastructure for pedestrians and cyclists and creating an integrated, efficient and accessible public transport system. One of the aims of my research is to see if the Ecobici-program forms part of such a modal shift, and if so, in which ways.

2.2.3 Urban inequality

According to Tonkiss (2013, p. 63) the current urbanization processes are often followed by processes of “unequalization”, leading to increasing gaps in both developed and developing cities. The traditional indicators for measuring inequalities are income and consumption disparities but do often concern the uneven distribution on a national scale in an urban-rural and regional perspective. Nevertheless, the unevenness found in big cities can be even more severe than the one observed in the national economies and are related to several causes: Segmentation in the labour market, big informal sectors, lack of social protection and services, unequal access to opportunities, elite capture, corruption and discrimination based on gender, sex and ethnicity. Patterns of urban inequality emerge from contextually differing combinations of these factors.

Ecobici does not operate in all parts of Mexico City, it has a delimited geographical coverage (see chapter 3). That does not mean that you are not allowed to use the system if it is not available in your neighbourhood, but it is plausible to assume that its location affects who uses the system. If this is the case, it can be argued that the decision to implement Ecobici in one area as opposed to another contributes to foster urban disparities through unequal access. The aspect of urban inequality is closely linked to Campbell’s argument concerning social equity’s importance for achieving sustainable development, and thus something I am interested in exploring in my research. Does Ecobici contribute to sustainable development or does it foster exclusion?

2.3 Bike-sharing: lessons learned

In the introduction chapter, I introduced the history of bike-sharing and its main aims. Hence, in the following paragraphs I want to present some relevant aspects from the research field of bike-sharing, both in general and from specific case studies, related to facilitators and barriers, inequalities, key factors for success and impacts of bike-sharing.

2.3.1 Barriers and facilitators

To achieve modal shifts, either in form of shifts from one mean of transport to another or in relation to developing an intermodal transport paradigm, it is important to map the barriers that keep people from taking the leap as well as the facilitators, in order to succeed. As such, I have reviewed relevant literature to explore which factors prevents people from making use of the bike for the last mile, in combination with other means of transport in a modal mix or from taking the bike instead of the car for shorter trips.

Ricci (2015) outlines that according to most studies, although undertaken in different contexts, the predominant motivation for using a bike-sharing scheme is convenience, including factors such as reduced costs and travel times and increased options for transport. Furthermore, access to docking-stations in close range from home, socio-economic characteristics and travel patterns are thought to enhance the probability of bike-sharing use.

A qualitative study conducted in Brisbane, aimed at exploring the barriers and facilitators for using the shared bike-scheme CityCycle, shows that the most prominent barrier across all user-groups (non-frequent cyclists, regular bicycle riders and CityCycle members) where safety concerns, especially in relation to lack of adequate infrastructure (Fishman, et al., 2012). Members of the scheme and regular cyclists also cited the lack of awareness and consideration for cyclists among drivers of motorized vehicles as a big concern, while users stated convenience as the single-most important benefit whilst contributing to the schemes' success interestingly emerged as a motivational factor for joining in. Perceived inconvenience related to the sign-up procedure, mandatory use of helmet – both in terms of hygiene considerations related to public helmets and the reduction of spontaneity, docking station placement and general coverage (especially highlighted by non-user), lack of effective marketing, operational hours (5 am to 10 pm), user-friendliness and information were other barriers outlined by the participants in the study (Fishman et al., 2012).

Another, quantitative study exploring the barriers and motivators for using bike-sharing schemes in Brisbane and Melbourne with the aim of enhancing knowledge concerning the significantly lower usage rate in Australia compared to other countries (Brisbane has a rate of 0,32 trips per bike per day and Melbourne 0,71 (de Chardon et al., 2017)), show that the convenience of motorized travel and the lack of access to docking stations are prominent barriers (Fishman et al., 2014a). One interesting finding is that the third most cited factor (after safety and convenience related aspects) among non-members were “nothing, I am not interested

no matter what”, regarding what would encourage them to join. In terms of motivational factors among members, convenience, access to docking stations in close proximity to workplace and health benefits received the highest response rate. The lack of mention of closeness home-docking station might stem from the concentration of stations in a business area and the systems modest size, especially in Melbourne (Fishman et al., 2014a).

2.3.2 Success factors

One of the key factors related to the success of bike-sharing scheme is its high degree of adaptability to cities with different sizes and characteristics (Midgley, 2011). There is no such thing as a blueprint model of bike-sharing, every city makes its own version suitable for its population density, weather, topography, infrastructure and culture, but according to ITDP (2014, p. 12) there exist some common features among the most successful schemes:

- High density of docking stations in the coverage area, with an average distance of 300 meters between stations
- Comfortable bicycles with distinctive design and features which discourage theft
- Fully automated locking system with high degree of user-friendliness which facilitates the pick-up and return process
- Wireless tracking systems that monitors the trips (route) and identifies the user
- Real-time monitoring of bike availability at the docking stations
- Real-time information made available to end-user on-site and/or through apps and webpage
- Pricing structures that encourages short trips, which helps maximizing the rate of trips per bike per day.

Furthermore, Ricci (2015) argues that the most important lesson learned from reviewed evidence is that clear political, policy and public support to sustainable mobility in general and cycling in particular, is both beneficial and necessary for bike-sharing to succeed. Furthermore, promotion of a positive cycling culture and providing quality cycling infrastructure has been identified as complementary, and in some cases decisive, measures for upholding bike-sharing during and after its introduction.

2.3.3 Performance

A study based on trips per day per bike, mainly in European and US bike-sharing systems, shows that the following eight variables are likely to have a causal effect on performance: Economic model; non-profit systems turned out to have a lower performance than commercially operated system, likely due to a limited marketing budget, less facilitation support from local authorities or goals differing from maximization of trips. Helmet requirements enforced by law seem to effect performance negatively, but only four known examples make the isolated effect uncertain. Larger populations have small, but significant positive effect on performance. Weather is a determinant factor, although examples such as Copenhagen shows that there are local variations on the impact. Higher temperatures have a marginal positive effect up to a certain point, whilst an increase in wind effects performance negatively. The study suggests a correlation between greater variation in station size and reduced performance, while high station density increases performance. Cycling infrastructure showed variable impact rates, but generally had lower impact than expected (de Chardon et al., 2017).

The success of a bike-sharing system can be hard to determine, given that the established targets or purpose are vague or not established at all, or because the actual effect of the bike-sharing scheme often is hard to measure (Ricci, 2015). For instance, it's hard to measure health benefits, congestion reductions and increased use of public transport, examples of potential benefits put forward by Shaheen et al. (2010) and often adopted by politician as a "raison d'être" for bike-sharing schemes (de Chardon et al. 2017). Both because of the lack of parameters and precision level, what does health benefits mean and is that the purpose? Moreover, because it is hard to measure e.g. how much of a 2 % reduction in traffic congestion can be contributed to bike-sharing directly and how much is circumstantial.

Due to these discrepancies between stated (or non-stated) purposes and measured and/or perceived outcomes of bike-sharing schemes, de Chardon et al. (2017) suggest using the metric of trips per bike per day to measure internal *performance* (as success depends on having a goal) of a system but also to enable comparison between schemes. This approach shows that there are huge differences between schemes, with an average of approximately 8 trips per bike per day in highest ranked systems (Barcelona, Ljubljana, Dublin and Turin) and as below 0,5 in the lowest ranked systems, e.g. San Antonio, Bari and Santander. ITDP (2014, p. 40) indicates that Ecobici present an average of 5 trips per bike per day, but furthermore combines this measure

of efficiency with market penetration (measured through daily trips per resident) which combined situates Ecobici among the schemes with highest overall performance.

2.3.4 Impacts

Underlying many of the assumed benefits of bike-sharing is a presumption that a substantial number of bike-sharing trips are replacing journeys originally made by car (Fishman et al. 2014b). Nevertheless, studies have shown that this is rarely the case (Midgley, 2011). A study of bike-sharing schemes in Brisbane, Melbourne, Washington D.C., Minneapolis and London reveals that in all the aforementioned cities, bike-sharing trips were for the greater part substituting public transport and walking. Car substitution were modest and even more so in the case of London, probably due to a generally lower modal share constituted by car than in the other cities. Moreover, London presented a negative balance in terms of private car use reduction compared to car use generated by rebalancing activities – for every avoided km of private use there was an estimated 2,2 km of rebalancing travel undertaken by the operator (Fishman et. al, 2014b).

According to Murphy and Usher (2012) only approximately 20 % of the users of Dublinbike stated that bike-sharing substituted car use. This number is still significantly higher than the reported car substitution shares in London and Washington D.C., with 2 and 7 % respectively (Fishman et al., 2014b). In other words, most of the bike-share users in Dublin also substituted walking (~45 %) and public means of transport (~35 %). Furthermore, 40 % of the informants reported that they used bike-sharing in combination with another mean of transport, predominantly bus or train, explained by the placement of docking stations in central areas in close proximity to train stations and bus stops (Murphy and Usher, 2012).

2.3.5 Inequalities

In an overall perspective, the average bike-sharing user seem to be a white, young, educated and employed male (Ogilvie and Goodman 2012, Ricci 2015). According to Ricci (2015) One of the factors that influences unequal distribution is the geographical coverage of the scheme, evidenced through a study of the scheme Velo'v in Lyon, France. In this case, the ubication of the bikes is concentrated in socio-economically active areas, close to universities and transport hubs, which apparently has influenced the scheme's success in rapidly attracting customers with certain socio-economic characteristics, living in these areas. Evidence, for example from New

York's City Bike, has also shown that newer systems have used experience from more established systems to strategically position themselves in areas with high cultural, economic and social activity, in order to achieve high performance. Hence, it does not come as a surprise that the scheme will favour user groups with particular socio-economic profiles.

A study of users of London's bicycle scheme BCH revealed that almost 70 % of all registered users were men, with a higher probability of living in areas with low deprivation rates than non-users. Women were found to make less trips on average and over 60 % of the users lived within 500 meters or less from one or several docking stations. An interesting finding that emerged was that after adjusting for the higher probability of living further away from a docking-station, users living in deprived areas make more trips on average (Ogilvie and Goodman, 2012).

A few years later, a new study was undertaken to see if there had been any changes in the socio-economic profile of the users after expanding the coverage to include areas with higher rates of deprivation. The low share of female users remained more or less the same, whilst the expansion of the program affected the share of users living in poorer areas. For instance, the percentage of users living in highly deprived areas reached 12 % in the original bike-sharing zone and the overall proportion of users from poorer neighbourhoods increased to almost reflect their share of the general population. This evidence suggests that residents in poorer areas can and do use bike-sharing schemes, if they have access to it in their local area. Interestingly, there was no sign of change concerning these shares after the prices were doubled, although it might have discouraged the less privileged population from making casual bike-sharing trips (Goodman and Chesire, 2014).

A case study from Dublin reveals the same gender distribution pattern, with 78 % male and only 22 % female users. The majority of the Dublinbike users fell into the groups of middle or higher income and almost 60 % were between 25 and 36 years old (Murphy and Usher, 2012).

Research concerning gender balance related to cycling suggest that women cycle less in general as they tend to combine different activities such as shopping, commuting and picking up children from school in one trip, and this is facilitated by car use. That said, this is not evident in countries with high cycling share (Dickinson et al. referenced in Murphy and Usher, 2012, p. 117).

2.3.6 Bike-sharing in Asia

Bike-sharing schemes has become an integrated part of the urban image in a huge number of Western cities, but in an Asian context, they are a relatively new feature. Wuhan's (China) bike-sharing scheme was considered the biggest in the world measured by the number of bikes with over 90 000 registered units, until it recently was discontinued. Hangzhou hosts one of the densest systems in the world with an average of 9,75 million trips per month (International Business Times 2013, referenced in Mateo-Babiano 2015, p. 2) and studies reveal an exponential growth in systems in Asia, led by China. According to Mateo-Babiano (2015) many of the schemes that have been implemented in Asia are adaptations of Western models that doesn't fit with the local conditions at many levels. For instance, she pinpoints that the transport system in Asian cities are set to deal with contextualized urban challenges which differs from those experienced in Western cities. The unique mix of informal and formal transport options, their particular interaction and a generally higher modal share constituted by biking and walking, calls for a customized scheme fulfilling the specific needs present.

2.3.7 Ecobici Mexico City

As already mentioned, there are conducted two previous surveys among Ecobici users, in 2012 and 2014 respectively. The responsible for the execution of the surveys and elaboration of the consecutive reports has furthermore published two articles partly based on the survey from 2012: "El sistema de bicicletas públicas "Ecobici": del cambio modal al cambio social" concerning Ecobici's impact on modal and social changes and "Links among utility, recreational and sport bicycles. Analysing the impact of the "Ecobici" and 'Muévete en Bici' programs in Mexico City (2016-2012)". In this section I will outline some of the main findings and arguments from these articles that has relevance for my research.

The average Ecobici user is a middle-class male who has work as main occupation. Furthermore, more than half of the registered users lives in the boroughs of Cuauhtémoc, Miguel Hidalgo and Benito Juárez, areas which has the lowest marginalization levels and the active population with the highest incomes in the Mexico Valley. These findings might explain that despite having a very competitive cost, only 9 % reported economic aspects as a motivation for using Ecobici (López, 2013).

Ecobici's main aims according to López (2017) is to improve the options for urban mobility and to facilitate the intermodal trips performed with public transport and bike, within the

coverage area. The most listed reasons for signing up are related to convenience aspects such as ‘arrive faster’ (36 %), ‘avoid traffic’ (12 %) and ‘save money’ (9 %). Nevertheless, 12 % reported to have signed up for exercise purposes, whilst 11 % stated that their main reason for signing up were “for fun”. Furthermore, 86 % reported that they have experienced enhanced life-quality after starting to use Ecobici and among these 54 % mentioned improved physical shape, 32 % that they felt more relaxed, 18 % that they have more spare time, 16 % experienced better mood and 15 % better health. When it comes to what people perceive as the most prominent barriers for using bike as a mean of transport, 7 out of 10 mentioned vial education followed by the quantity of cars (34 %) and safety issues (accident related) (30 %).

López (2013) argues that the transformation of individual mobility patterns is produced through a change in its social representations. The implementation of Ecobici in central areas has contributed to give the bike greater legitimacy and social acceptance, given that its user’s characteristics, practices and choices differ from the stereotypical image of the bike user as someone from the working class that can’t afford to buy a car - a perception that traditionally has hampered the diffusion of the bike’s benefits and its use in Mexico City. Installing Ecobici in areas with an elevated social status and spreading a modern image of the bike hence promotes a development in both the value base of the inhabitants, as well as a social and cultural change.

Additionally, a study based on car substitution rates from the 2012-survey, show that Ecobici contributed to reduce greenhouse gas emission from urban transport in Mexico City with 232 tons of CO₂ equivalents in the period from its implementation in February 2010 to December 2012 (SEDEMA, 2013). It is worth nothing that this study didn’t take into account car use generated by rebalancing activities, and as such I consider that more research is needed to determine Ecobici’s impact.

2.4 Summary

As seen in this theoretical overview, sustainable development is not a new concept, but it has gone through certain modifications over the years. The concept comprises several aspects and Campbell (1996) highlights three of them, which he considers conflicting sizes: Economic growth, environmental protection and social equity. In relation to bike-sharing, I would argue that the environmental aspect generally emerges as a prominent aim, i.e. reduction in car use, air pollution and congestion. Furthermore, the economic aspect tends to be communicated as a pull-factor for users, e.g. bike-sharing schemes reduces the individual’s transport expenses. When it comes to the social aspect, there is little evidence that explicitly suggests that the aim

of bike-sharing is to reduce social inequality, but the pronounced economic accessibility might be regarded as a social equality measure.

Nevertheless, research on bike-sharing schemes shows that there often is a gap between the aim of the system and the actual outcomes. According to Ricci (2015) this discrepancy surges as a consequence of vaguely defined purposes and/or poor tools for measuring performance and impacts. For instance, car substitution is reported to be quite low across a range of schemes, whilst reduction in air pollution due to bike-sharing is difficult to measure. Interestingly, the majority of the studies reveal that the average user is a male with higher income and education level than the average population, an outcome that in several cases has shown to be linked to the geographical coverage of the scheme. This indicates that the aspect of the planner's triangle that seem to be less catered for, or even adversely affected, is social equity. Installing the system in certain places while omitting others seem to affect the characteristics of the user group directly. Still, more in-depth research including a broader selection of bike-sharing schemes is needed to fully understand which factors influences the user profiles and thus be able to address the skewed user pattern.

Through my research project, I want to analyse how Ecobici positions itself both in relation to findings from existent research on bike-sharing but also in connection to the following concepts outlined in this chapter; the automobile system, the sustainable mobility paradigm and urban inequalities. I will approach these issues by exploring the users and their motivations, the scheme's attractiveness, the constraints and opportunities it poses and the relation between intentioned and actual use. Finally, I seek to explain if Ecobici has contributed to the broader encompassing concept of sustainable urban development in Mexico City. Given the evidence present in former research, I am especially interested in the aspect of social equity - Ecobici for whom?

3. Context

In this chapter, I will situate my research question in a contextual frame, in order to give a more comprehensive overview of both the field area and the research topic. The chapter is divided into three parts: The first part contains a description of Mexico City, the second outlines central aspects related to shared public bicycle schemes in general, as well as some key aspects related to Ecobici in particular, and the third contains a brief description of the specific neighbourhoods where fieldwork was performed.

3.1 Mexico City



Picture 1: View northward from Torre Latinoamericana, Centro, Mexico City.

Mexico City is the country's economic, political and cultural centre, as well as an important tourist destination. The city caters for a considerable industry production and is the heart of the country's banking and financial system and home to several of the most prestigious institutions for higher education in both the country and the region (Mexico by, 2019). In 2017 Mexico City produced 16,5 % of Mexico's total GDP (INEGI, 2018a).

Mexico City is located in the middle of the broad Mexico Valley at an altitude of 2250 meters, south of the big central plateau and surrounded by mountains. The city comprises a territory of 1479 km², which is partially resting on the remains of the drained lake Texcoco (Mexico by, 2019). Currently, as much as 80,2 % of Mexico's population is estimated to live in urban areas and about 1/4 is centered in and around Mexico City (CIA, 2018). In the Metropolitan Zone of the Mexico Valley, popularly known as "Valle de Mexico" (Mexico Valley), consisting of the

16 boroughs in Mexico City, 59 conurbated municipalities in The State of Mexico and one municipality in Hidalgo the population is estimated to over 20 million (OECD, 2015). This makes the city one of the world's 10 largest metropolitan areas according to the United Nations (2016), and the third largest in the OECD (OECD, 2015). The inner city has an estimated population of 9 million (Ireland, 2015).

History

Mexico City was founded with the name Tenochtitlán around 1176 and thus is probably the oldest city in the Americas. It became the capital of the Mexica civilization in 1325 and when Hernán Cortés conquered the city in 1521 it is believed to have had 300 000 inhabitants. Mexico City remained the most important city in the Spanish-speaking America for the next centuries, but after Mexico declared independence in 1810 a few decades of civil unrest and occupation by the US and France followed (Mexico by, 2019). Today the city represents both the historical and the modern, with an interesting mix of cultural heritage, foreign influence, old and new architecture, green spaces and countless culinary and cultural offers.

Climate

Mexico City has an average annual temperature of 16 degrees C and a yearly rainfall between 600-1200 mm, dependent on the location. The climate is divided in two seasons, the dry season, which runs from November to April and the wet season, which runs from May to September and contains most of the city's yearly precipitation. The coldest months are December and January, with a minimum temperature of 3 degrees C at nighttime and the hottest months April and May, with maximum temperatures of 30 degrees C (SEDEMA, n.d., p 26). The comfortable temperature and temporarily delimited rainfalls make the city apt for year-round cycling.

Political and administrative organization

Mexico is a Federal Republic, constituted by 31 states and one federal entity (Mexico City). Every state has an elected governor and a legislative assembly. The executive power is held by the president, which is elected for a 6-year term, without possibility of re-election. The president is both chief of state and head of government and entitled to appoint his cabinet. The legislative power lies in the National Congress (Congreso de la Union) which consist of the Senate (Camara de Senadores), with 128 seats and the Chamber of Deputies (Camara de Diputados) with 500 seats. The Supreme Court of Justice (Suprema Corte de Justicia de la Nacion) and the Electoral Tribunal of the Federal Judiciary form the judicial branch (CIA, 2018).

Mexico City, formerly known as “Distrito Federal” (D.F), is the seat of the powers of the Union and the capital of the United States of Mexico. When it ceased to be a Federal District and became a federal entity on the 29th of January 2016 it was given the same autonomy, but not total sovereignty, as the 31 other federal States of the country (Chávez, 2016). In other words, it has autonomy in all matters concerning its internal regimen and political and administrative organization, which according to its local constitution, and in line with the Mexican Constitution, is republican, representative, democratic, laic and popular (Gaceta Cdmx, 2017, p. 3). In the National Congress, the entity of Mexico City is represented on the same terms as any other state.

The Government of Mexico City is in charge of the federal powers and the local executive, legislative and judicial bodies. Mexico City is further organized in 16 boroughs, which forms the baseline of its territorial and political organization. The boroughs are constituted of hundreds of neighbourhoods, locally known as “colonias”, which possess no jurisdictional independency or representation. Each borough is led by a “capital mayor” popularly elected for a 3-year term with the option of re-election and includes a group of 10 to 15 elected councillors. The boroughs have autonomy in decision making related to administration, security, budget and public works, among others (Gaceta Cdmx, 2017, p. 83-98).

The Corruptions Perceptions Index reveals that the perceived levels of corruption in public sector in Mexico are high. Mexico is ranked as number 138 of 180 countries, with a score of 28, and this number has been reduced steadily by one index point each year since 2015 (Transparency International, 2018). In other words, the perceived transparency of the Mexican public sector is low and declining.

3.1.1 Mobility issues

As mentioned in the introduction chapter, Mexico City’s mobility policies has historically been focused on improving the conditions for private vehicles. Investments in road infrastructure and other measures to enhance speed and accessibility for cars has resulted in an inefficient public transport system suffering from capacity and quality problems and poor conditions for pedestrians and cyclists (OECD, 2015, p. 138). Furthermore, it has led to negative consequences of both social and environmental nature, such as reduced life-quality, congestion and high levels of air pollution.

Approximately 88 % of the greenhouse gas emissions in the city are related to energy consumption based on fossil fuels and electricity in the sectors transport, industry, trade, housing or services (UN-Habitat, 2011, p 50). The air pollution is reinforced due to the topographical conditions, causing the meteorological phenomenon inversion (OECD, 2015), and in the 1990s Mexico City was named the most polluted city in the world by the UN (Ireland, 2015).

One of the concrete measures that was implemented to combat the pollution was the “hoy no circula” program, which consists in prohibiting vehicles from circulating on certain days based on their emission rates. The actual effect of this program is highly contested as 70 % of the city’s registered cars can circulate daily (INEGI, 2017) and that many inhabitants avoid the restrictions, e.g. by having a second car (Franco, 2016). Another measure that has been implemented to improve the air quality and traffic flow is the “Metrobus” (Bus Rapid Transit-system) and the introduction of “Ecobici”, which is Latin-Americas first and biggest shared public bicycle scheme. Today, Mexico City’s air pollution values have come down to levels equivalent to those of Los Angeles (Ireland, 2015).

Many people living at the outskirts of the metropolis works in the inner city and more than 40 % of the residents in the Mexico Valley crosses a municipal-level boundary in their daily commuting (OECD, 2015, p. 68). Despite of the expansion of massive means of public transport most of these travels are performed with informal means of small motorized vehicles, placing the Mexico Valley among the most congested metropolitan areas in the world. Estimates show that in 2014 an additional 29 minutes were lost for every 30-minute commute, causing significant economic losses and substantial negative impacts on residents (OECD, 2015, p. 74).

For decades, it has been a status symbol to own a car and it has been quite a common practice to “invest” in a private car as soon as you have the possibility. This is still practiced in many groups, but services such as uber has experienced increasing growth in popularity the last years, which might indicate that a shift is on its way regarding car ownership – especially among young professionals that lives in central parts of the city. That said, this doesn’t seem to have impacted the amount of cars circulating in the city. In 2017 Mexico City had a total of 5.47 million registered cars (INEGI, 2018b), an increase of more than 2 million in just 10 years.

Mexico City (formerly D.F.) launched a new mobility law in 2014 where it is stated in Article 6 that they will prioritize the use of road space and distribute budgetary resources in accordance with the following mobility hierarchy (Gobierno Cdmx, 2018):

- I. Pedestrians, especially persons with incapacities and reduced mobility
- II. Cyclists
- III. Users of public passenger transport
- IV. Providers of public passenger transport services
- V. Providers of freight transport and distribution of goods
- VI. Users of private automobiles

Furthermore, the city has faced a surge in new mobility alternatives in recent years, with the introduction of several dockless bike-sharing systems, car-sharing, electrical scooters and electrical kick-scooters for short-term rental. According to Urry (2004), such changes in transport policy, development of new mobility alternatives and de-privatization of car ownership are measures that together can enable a shift away from the system of automobility.

Although local authorities have developed several planning tools and measures for reducing greenhouse gas emissions and improving the mobility situation, UN-Habitat (2011, p. 25) argues that fragmentation in local governance and lack of institutional capacity poses substantial constraints to the policy-making and its effects.

3.1.2 Means of transport

Due to its extensive area and numerous population, the city has an impressive, and somewhat chaotic, range of transport means, of both public, semi-private and private character. The more formal means of public transport includes the city's extensive metro system, metrobus (BRT), Ecobus, M1, trolleybus, Ecobici, light rail and suburban trains, which all have established routes and stops. Alternatives that are more informal include countless buses, minibuses, "peseros" and taxis that has been granted a permission to operate certain routes or areas, but their actual trajectory is often considered tacit knowledge and it is often possible to board them in between "official" stops. Private alternatives include uber, cabify, mytaxi, Econduce (electrical scooters), Grin (electrical kick scooters) and Mobike and Vbike (dockless bike-sharing systems), among other services offered through mobile platforms. Partly because of this confusing conglomerate of public and private means of transport, there does not exist any integrated ticket or payment solutions for transport in Mexico City. However, some alternatives such as the metro and metrobus offers a discount if you transfer from one service to another, and it is possible to pre-pay for metro- and metrobus tickets using the same smartcard used for Ecobici memberships. The latest numbers on modal share indicates that on an average weekday

approximately 50 % of the population undertake a journey or part of a journey with public transport, 22 % makes a trip with private means of transport, 66 % walks and 2.2 % uses the bike (INEGI, 2017, p. 23).

3.2 Ecobici

One of the main objectives of “Plan Verde” in terms of mobility was to incentivize non-motorized mobility by, among other measures, boosting cycling as an alternative transport option by promoting bicycle culture for both recreational and commuting purposes through a permanent campaign (Gobierno D.F., n.d.). In 2007 it was calculated a total of 100 000 daily trips by bike in Mexico City, which amounted to 1 % of the total trips realized per day. The local government set a goal of incrementing this number to 5 %, meaning approximately half a million trips by bike per day, and to reach this goal they concreted four main objectives: 1) Create networks of cycling infrastructure. 2) Integrate the bicycle in the public transport network. 3) Make the bicycle accessible to the inhabitants. 4) Promote the culture of bicycle use. (SEDEMA, n.d. p. 11).

Furthermore, the strategy outlined six contemporary conditions and risks in Mexico City, which underlined the need for taking action: The general population perceived the city as unsafe and an average person spent two hours on transfer. 50 % of the population suffered from overweight or obesity and the city had low standards of life quality, present in high levels of air pollution and deficient medical services. Moreover, the city presented a deficit in green areas according to international standards and had 2.9 million private and public cars in circulation. The desired outcome was a more enjoyable city with better mobility, major social coexistence, better health and greater equity. (SEDEMA, n.d., p. 12-14).

One of the measures suggested for achieving the above-mentioned goals was access to bikes, both through public bikes and rental bikes. The aim was to install efficient and novel programs for access to public bikes in central parts of the city in terms of transport, recreation, sports and other activities. The strategy defined that the access to the public bikes should be accessible for the users of public transport in order to complete shorter trajectories, e.g. more than 10 minutes of walk or less than 15 minutes on bike from the metro-station or office (SEDEMA, n.d, p. 114).

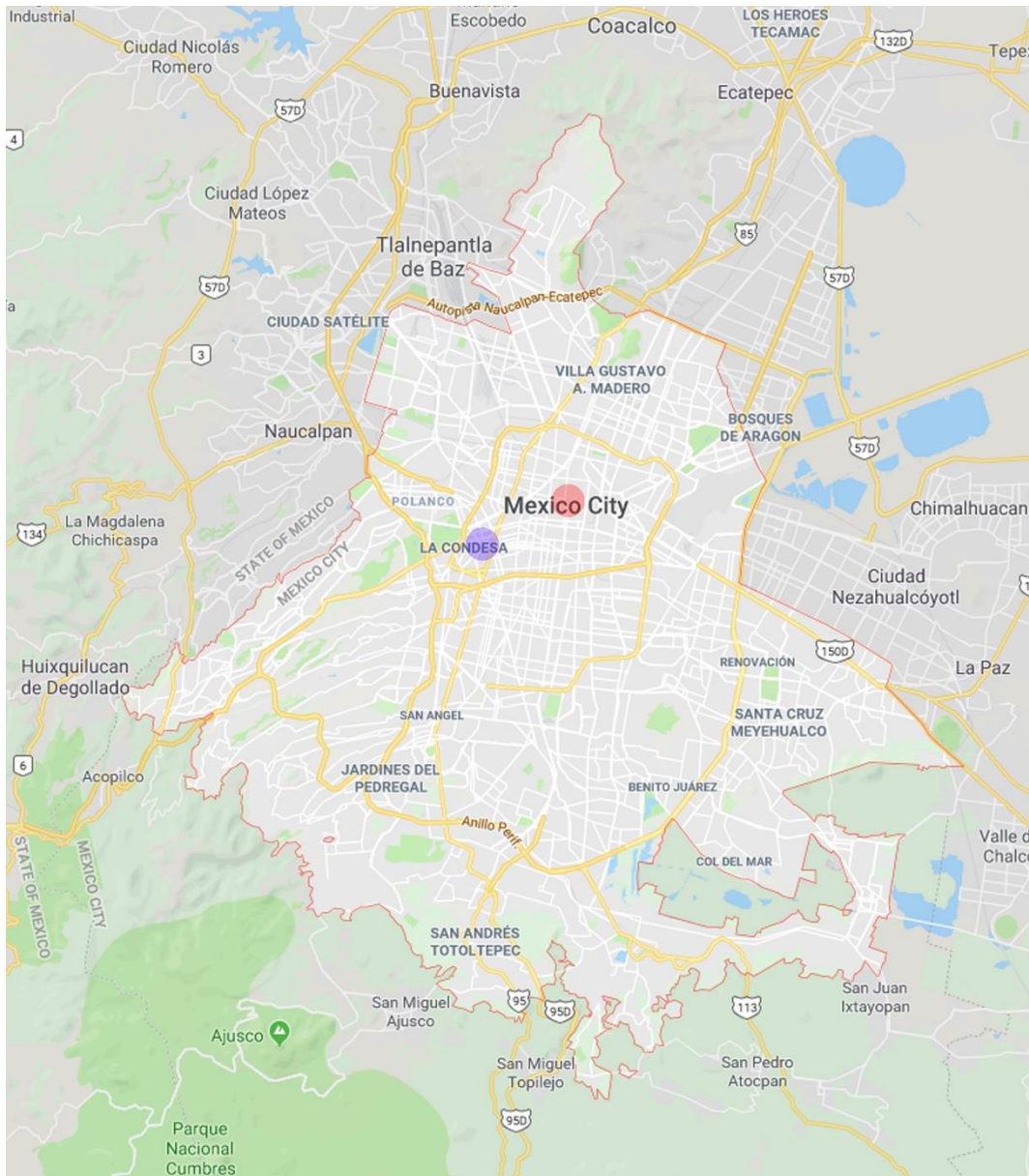
Ecobici shall, according to their official website, function as an effective supplement to other means of transport and as such contribute to a reduction of traffic-related problems in one of

the world's biggest cities, but also give health, environmental and timesaving benefits that can contribute to increased life-quality (Ecobici, n.d.)

Ecobici has since its launch been administrated by SEDEMA, while the private company Clear Channel (ITDP, 2014, p. 90) runs the daily operation and maintenance. In the beginning, the system comprised 84 docking-stations and 1200 bikes, but due to high demand, it expanded with 400 % the first 6 years. The expansion has been continuous over the last years and today there are more than 6800 bikes scattered around the city on 480 docking-stations. The latest addition is the implementation of electrical bikes, which allows the users to travel larger distances. The scheme is operating every day of the week from 05 am to 1230 am and have more than 250 000 registered users in 55 neighbourhoods, spread over 3 boroughs, which gives a total coverage area of 38 km². The annual membership currently has a cost of 462 Mexican pesos, which equals approximately 22 euros, and is in other words heavily subsidized by the city government (Ireland, 2015). The annual membership includes unlimited travels up to 45 minutes. (Ecobici, n.d.).

3.3 Description of field area

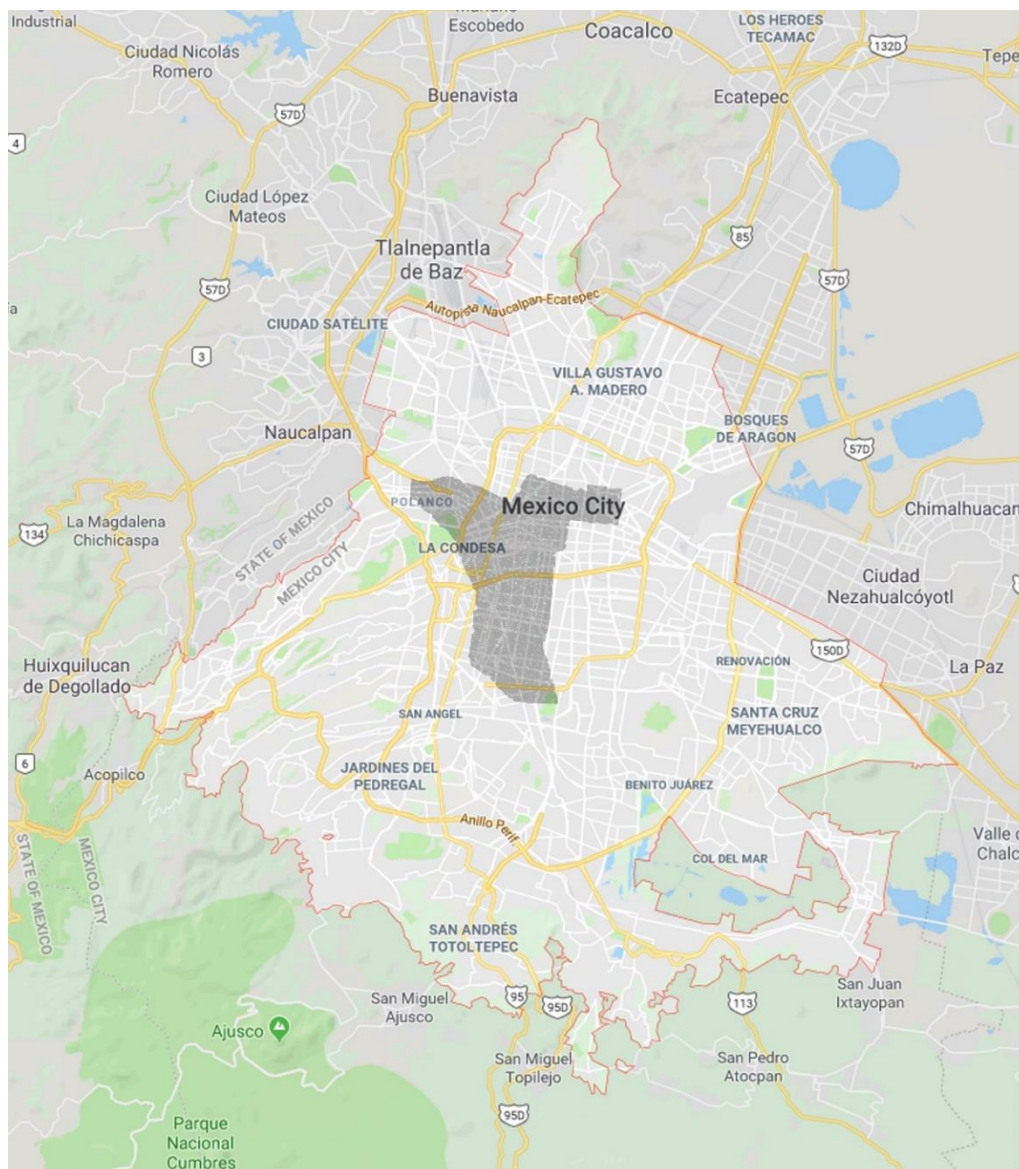
In this section, I will give a brief description of the specific field area for my research project. I will start with a description of the general Ecobici-area by outlining its' current geographical extension, before moving on to introduce my two chosen neighbourhoods, Roma Norte and Centro. The reasoning behind the selection of these particular neighbourhoods, are outlined in chapter 1.



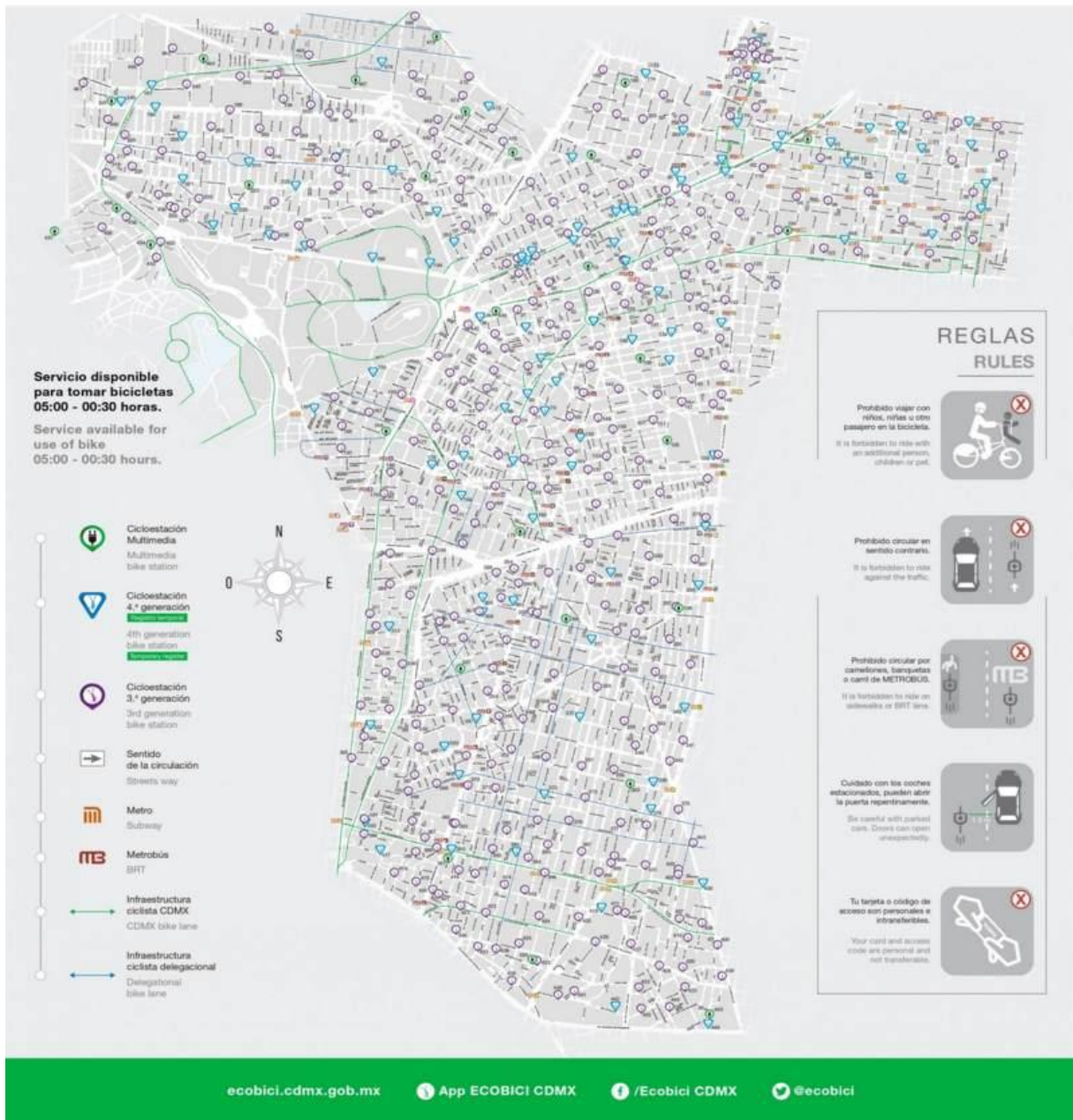
Map 1: Map illustrating the extension of Mexico City (CDMX) and locating the field areas Roma Norte and Centro. (Derived from Google Maps, 2019)

3.2.1 Ecobici area

Ecobici currently covers an area of 38 km², comprising 55 neighbourhoods within three of the 16 boroughs, and coincides spatially with the areas which has the highest density of jobs as well as the lowest marginalization rates in Mexico City (Lastra, 2018). The scheme spreads out from the central parts of Mexico City, comprising the neighbourhoods of Roma, Condesa, Hipodromo Condesa Cuauhtémoc and Juárez, among others. It extends north to the neighbourhoods of San Rafael and Buenavista, west to Polanco 1st section, east to Centro and further follows the corridor of San Miguel Chapultepec 1st section-Roma and San Pedro de los Pinos-Narvarte Poniente down to Xoco and General Anaya in the southern part of the city.



Map 2: Map illustrating the coverage of Ecobici in Mexico City. (Map derived from Google Maps, 2019 and Ecobici, 2019)



Map 3: Ecobici map showing the stations and routes (Ecobici, 2019).

3.2.2 Roma Norte



Picture 2: Ecobici docking station 134 Alvaro Obregon-Orizaba, Roma Norte.

Roma Norte is a neighbourhood situated in the borough of Cuauhtémoc with close proximity to Avenida Reforma and Insurgentes, important financial and commercial veins in the city, the famous park Bosque de Chapultepec and the historical downtown known as “Centro Histórico”. Its construction started in the beginning of the 20th century and was later amplified with what is today known as Roma Sur. In its first decades it served as a retreat for the city’s upper class, with decadent art-nouveau and neo-classical mansions, wide boulevards and three-lined walkways inspired by Parisian avenues. Many of these buildings can still be appreciated, even though they were partly demolished to give room to other types of housing that satisfied the new middle-class settler’s demand for modernity, when the neighbourhood started to lose importance. The earthquake of 1985 (and to a lesser extent that of 2017), also caused severe damages to a lot of constructions in the area and contributed to further decline. In the beginning of the 21st century the neighbourhood entered a development path of reinvention and growth, facing new real estate projects, conservation of historical buildings and a surge in cultural, gastronomic and entertainment offers, which has led to a resurgence in popularity and housing prices and a subsequent (re)gentrification process (Alcaldía Cuauhtémoc, 2017).

Roma Norte’s socio-economic status is classified as medium to high, with a low to very low reported level of marginalization (Ávila, 2015, p. 65). In 2010 there were 27770 inhabitants (Ávila, 2015, p.15).

The neighbourhood is today characterised by a bohemian vibe with a lot of commercial activity, including one of the city’s best culinary scenes, cafeterias, galleries, independent shops, bars, parks, theatres and cinemas, which attracts young professionals, both to reside in and to visit the area. Together with the Condesa neighbourhood, Roma make up the cultural-corridor of Roma-Condesa.

Due to its central location, Roma Norte has access to a wide range of public transport, such as the metro, metrobus (BRT), trolleybus, different minibuses and Ecobici.

3.2.3 Centro



Picture 3: Ecobici docking station 29 Reforma-Bucarelli, Centro.

Centro is a neighbourhood situated in the borough of Cuauhtémoc, which comprises Mexico City’s historical downtown. As the name indicates, it is the true centre of the Mexican capital, both in geographical terms and as the heart of the country’s political and public life. The neighbourhood houses famous landmarks such as Torre Latinoamericana, Bellas Artes, the Metropolitan Cathedral, el Zocalo, Templo Mayor, The National Palace and Alameda Central,

as well as countless museums, political and religious buildings, plazas, gardens, sculptures and monuments with high historical and artistic value. In addition, it caters for a wide range of both formal and informal commerce, restaurants, cafeterias and traditional drinking holes. In 1987, it was included in Unesco's list of world cultural heritage, and as such it attracts a huge number of national and international visitors every year. Centro's history draws back to at least 1325 when it was an islet surrounded by navigable lakes, which constituted the principal means of communication in the pre-Columbian era. (Alcaldía Cuauhtémoc, 2018).

Centro is considered a middle-class neighbourhood with a medium to high reported level of marginalization (Ávila, 2015, p. 23), representing considerable variations across its territory. In 2010 there were 61 229 inhabitants in Centro (Ávila, 2015, p.15). The neighbourhood is today known as a hub where history meets modernity and locals meet tourists, and as such constitutes a mayor nod for transport, with access to metro, metrobus, trolleybus, microbuses and Ecobici.

4. Methodology and methods

The aim of this chapter is to outline the methodology and methods used in the elaboration of this research project. By describing and discussing the motivation behind choosing certain methods over others in connection to the research question and the project's formal framework, I seek to clarify and highlight how the data production upon which the research is based has been conducted. As such, in the following chapter I will present the research design, methods used for data collection, sampling strategies and my fieldwork experiences. Furthermore, I will discuss framework and delimitations of the research, my positionality in the field, ethical issues, data quality and lastly challenges that I met along the way.

4.1 Methodological approach

The main reason for my choice of performing fieldwork is that I am highly interested in the contextual aspects' influence on the research project. How does for instance the local conditions, culture and habits influence the collection of data? Furthermore, what do I, as a researcher, bring into the investigation in virtue of my personal features and experiences and how does this affect my position in the field and the data production? I will argue that being present in the field area and speak directly to people and thus be able to clarify possible ambiguities or elaborate on interesting topics that emerge, observe the phenomenon in question and control the selection of informants through applying on-site sampling strategies, not only gives added value. Rather, I find that conveying research on-site enhance the possibility of gathering data that will enable me to answer the research question; **“in what ways does Ecobici contribute to a more sustainable urban development?”** in an informed and integral way.

My methodological approach has been mainly qualitative, although I also have produced some quantitative data through the application of surveys. The main reason for this relates to the research questions qualitative nature. The first sub research question; *“who are the users and what are their main motivation for using Ecobici?”* does partly require some quantitative data, but in terms of the system's attractiveness, the constraints and opportunities it represents and the relation between intentioned and actual use, the data needed is prominently qualitative. Hence, I consider that a fieldwork based, qualitative approach is the most suitable for my research purposes.

4.1.1 Scientific approach

One of the first aspects that a researcher needs to take into consideration is the scientific approach that will form the baseline of the research.

According to Busch (2013, p. 50), the three most crucial concepts to discuss within theory of science is ontology, epistemology and methodology. Ontology is related to our conceptions of the world. Does an objective world exist outside ourselves? Or could we just understand the world as our own interpretation of it, meaning that there exist multiple worlds? Epistemology on the other hand, relates to how and to which extent we are able to acquire knowledge about the world, and hence is more relevant for scientific research.

Busch (2013, p. 51) furthermore argues that there are two key concepts that needs to be addressed: positivism and hermeneutics. A positivistic view is based on the proposition that scientific methods can reveal an objective reality, whereas a hermeneutic view takes the opposite stand and claims that there is no such thing as an objective reality – just subjective meanings about reality. In my project, I advocate a hermeneutic approach to research, which means that I seek to analyse and interpret the data I have gathered through the fieldwork. To conclude this general overview of my scientific approach, I would like to add that my methodology has been mainly inductive, meaning that I have undertaken my data gathering without a preliminary hypothesis or theory that I want to prove right or wrong (which is the case in deductive research), but rather have sought to gather empirical evidence for analysis and interpretation (Busch, 2013, p. 51).

4.2 Research design

My choice of methods was motivated by the aim of the research project, which quite obviously was to answer the research questions outlined in the introduction chapter. In other words, I sought to choose the best tools for providing information that would help me answering these questions. Considering the abstract sound of the general research question, it does not come forward as outright obvious which methods would be the most suited to answer it. Consequently, I decided to base my choice of methods on the sub-research questions and the practical framework of the research, and asked myself: Which methods will most effectively enable me to produce data that can contribute to respond the sub-research questions (and hence make it possible to answer the general research question), within the limitations posed by practical, economic and security issues related to my research project? The answer to this

question turned out to be a mixed-methods approach consisting of two principal methods; a survey and semi-structured interviews, and two supplementary ones; observation and field conversations. In addition, I wrote a field journal throughout my stay in order to keep track of observations, thoughts and experiences that I had while performing fieldwork. More specifically, the research is based on the following data types and amounts of data:

- Surveys: 90
- In-depth interviews: 12
- Field conversations: 15 – varying from a few minutes to an hour
- Observation

The survey was targeting the users of the bicycle scheme in the two chosen neighborhoods, Roma Norte and Centro, with the aim of getting an overview of user characteristics, motivations, purposes, constraints and opportunities. The semi-structured interviews were applied to users with the aim of getting a more in-depth understanding of their overall impressions of the Ecobici scheme, their motivations for using it and their thoughts on advantages and deficiencies, as well as how they use the system – all the aforementioned feeding into the sub-research question RQI-III. Interviews was also conducted with non-users in order to get the “other side” of the story represented, but also to get better insights into the constraints that the scheme faces (RQ II). Lastly, I interviewed a few stakeholders with different connections to the Ecobici scheme, with the aim of outlining the historical, cultural and political backdrop of the system, as well as to produce data that can contribute to answering RQ-III: The relation between intentioned and actual use.

As for the observation and field conversations, these were thought of as additional means of data gathering methods, with the aim of supplementing the main methods with own experiences, information obtained throughout chats that are more informal and the general functioning of the scheme.

4.3 Fieldwork

This MA thesis in human geography is based upon two months of fieldwork conducted in two distinct and geographically separated neighbourhoods in Mexico City, during the period spanning from the 31th of May to the 31th of July 2018. Prior to heading out in the field I did some preliminary research related to the operation and coverage of Ecobici, mapping and contacting stakeholders of potential interest as well as some risk assessment concerning suitable areas for undertaking fieldwork as a solo female researcher.

The main reason behind my decision to undertake fieldwork for this research project, was that I wanted to experience the Ecobici scheme first-hand. Both in terms of how the system works, how it is integrated and received in the city and to meet the users and stakeholder's on-sight. Although I could have done a research project based solely on existing reports or by setting up an online-survey, I found that these simplified approaches couldn't compete with the added value that fieldwork brings to a research in terms of getting behind the scenes of the area, and the widened possibilities of applying a range of methods in one research project in order to explore the research topic. The fieldwork-based approach also allowed me to establish geographical delimitation of the field area and to ensure that my sampling criterions actually were fulfilled. Furthermore, I consider fieldwork as a very good learning experience, both in academic and personal terms, as it poses a lot of challenges and opportunities, both in the planning, implementation and processing phase, that a conventional research project based on e.g. literature review does not imply.

Before I got to the field area, I had only been to Mexico City for a couple of brief visits, the most recent one in spring 2017. So even if I felt quite familiarized with the broader context, given that I have lived in Mexico for almost 3 years, I did feel somewhat overwhelmed facing this vast metropolis. Not to mention the fact that I intended to explore the city by bike.

4.3.1 Selection of research sites

Stating that Mexico City is a too broad field area is quite an understatement, especially considering the timeframe of this research project and the huge distances in Mexico City – caused by a combination of urban sprawl and traffic congestion. It was therefore essential to make some delimitations before heading out into the field. I decided early into the field trip preparations that I wanted to be based in a centrally located and “familiar” neighbourhood with Ecobici coverage. First and foremost, because it made for a strategic starting-point for my research, but also due to safety concerns. I was encouraged by my supervisor to choose at least one other neighbourhood to apply the survey, preferentially with a different socio-economic composition than the former. Not primarily to make a comparative study, but rather to get a broader sample and if possible, look for differences between the two. I therefore decided to stay in Roma Norte, where I also conducted half of the surveys. To choose the other neighbourhood I spoke to friends, acquaintances and informants for recommendations that fulfilled the main criterions, eg: Ecobici coverage and a different socio-economic status and profile than Roma Norte. Many people mentioned San Rafael, a more residential neighbourhood some 2,5 km

north of Roma Norte. After spending a few hours in San Rafael looking for docking stations suitable for undertaking on-site surveys, I decided to give it a try. But after a couple of days trying to recruit informants to the survey, I found that I had to give up and search for an alternative site, as it was close to impossible to get informants. I think this experience mainly has to do with the profile of the neighbourhood, in combination with my survey hours. As it had a lot more residential feel to it with a lot fewer commercial activities attracting people from other places, I assume that most of the trips would be in the early morning and late afternoon. After a quick research, I decided to head downtown to the area surrounding the famous landmark Alameda Central and the beginning of Avenida Reforma, popularly known as “El Centro” and formally as neighbourhood Centro. Here I also spent a few hours mapping the most suited docking stations, and a combination of practical aspects and safety concerns made me conduct the surveys at the two docking stations of Alameda Central as well as some docking stations in Avenida Reforma.

The choice of docking-stations was based on a combination of strategic location, meaning that it seemed to be a reasonable amount of traffic of people taking and parking bikes at the respective docking stations, and the surrounding infrastructure in terms of the possibilities for conveying an on-site survey. Hence, the docking-stations I chose in Roma was situated in the heart of the neighbourhood and surrounded by wide sidewalks or islands, and those in Centro was either located on the edge of the park Alameda Central or in connection to spacious sidewalks.

4.4 Positionality

Smith (2016, p. 98) states that a research project never can get around the power relations shaping the places or situations where we are performing the research, and we must therefore make sure to address these issues thoroughly. Both by considering them in the choices we make throughout the research process, but also by considering them in the constant negotiation of producing and gathering data in the field, as well as in the process of data interpretation. Smith outlines that one strategy for tackling these inequalities is to examine closely the complex positionality of the researcher, hereunder aspects as gender, race, education, age and experiences (Mullings, 1999), and develop a reflexivity around how our identity shapes the knowledge production and the impact our presence might have on the research process itself. In other words, the production of knowledge is never a neutral or unbiased process (Cresswell, 2013, p. 156).

The researcher's active role in the data production requires that he is able to both position himself on the inside of the context he is studying, but also from time to time distance himself from the processes he observes, in order to pick out, categorize and analyse the experiences he is having in a more systemic manner – regardless of how familiar or unfamiliar the field area or research topic is to the researcher (Paulgaard, 1997, p. 71).

According to Aase and Fossåskaret (2014, p. 64-66) the goal of any researcher is to get “behind the scenes” and in this way be able to study processes that are normally invisible for the bypassing spectator. Nevertheless, this is easier said than done, and it is therefore more common that the researcher negotiates his way to be granted a temporary semi-local position accepted by the social system where he is undertaking fieldwork. This positioning is strongly linked to status, defined as a social position with attached rights and duties, role, which implies the actual behaviour a person chooses to play out based on his status, and social relations, which are established based on the status sets and role expectations present in the field.

Before getting into the field I thought quite a lot about my position in the field, and how it might influence the data gathering process, but also the interpretation and process of making sense of the data. The facts that I would obviously not be able to change was my position as a white, female and 28-year old, foreign researcher. But beforehand I reflected upon two things that I would be able to influence, the first being my awareness and reflexivity concerning how and in which sense these attributes would affect the data production. The second, how I could balance and negotiate my status as alternately being an insider or outsider. As I have lived in Mexico for several periods, I was well aware that the locals see me as an outsider, based on my physical appearance. Being called “guera” (referring to white or blond female) or “gringa” (slang for female from the US, but popularly used for anyone with a foreign aspect) is a common experience and in a way marks the distance between “them” and me. However, apart from being a nickname it also tends to have some expectations and prejudices attached to it. Traditionally the Mexican society has favoured people with white skin, evident in tv-programmes, commercials etc, and the skin colour has often been linked to the economic position of the person.

Hence, my physical appearance has often led to (erroneous) assumptions about my economic and social status, a foreign, educated person with money, which again comes with a set of role expectations (Aase and Fossåskaret, 2014): Poor language skills and lack of understanding of the local culture, history and social norms. Whilst this status in some cases grants “benefits” in terms of positive discrimination; in one occasion I was let in on the metro by the guards because

my metro card was empty (and consequently I didn't have to queue to get a ticket), and in the wagon I was offered a seat by several (male) travellers. This differentiated treatment reinforces the sense of not being granted complete access to the field, and I would also like to add that I personally find this positive discrimination uncomfortable and problematic, taking into account the social class hierarchy it reflects.

In-line with what Fossåskaret and Aase (2014) describes as the only way to be able to change your status; I acted opposed to the role expectations. More specifically this meant that I undertook all my research encounters in fluent Spanish and showed throughout interviews and surveys that I possess considerable knowledge about the local language, history and culture. Through this, I felt I managed to change my status from being considered a foreign, "ignorant" researcher to being considered, partly, as "one of them". That said, in various occasions while I was undertaking the survey, I had to specify that I was not representing any political party, the government or the bicycle scheme. It seemed that many informants thought the questionnaire had political purposes or that I was representing Ecobici. It should be highlighted that my research was carried out right before and after the presidential elections (held on the 1th of July 2018), so this scepticism was most likely more prominent than usual. In these cases, I felt that I was able to change the informant's perception of my status through my behaviour, but also by wearing a nametag with the logo of the University of Bergen.

In the next paragraphs, I will present more thoroughly the methods I chose for my data gathering process and the practicalities and challenges related to the fieldwork.

4.5 Methods

The use of different methods within one research project is known as a mixed-methods approach, which often has the purpose of triangulation. Triangulation essentially implies to use different sources and methods to illuminate the research questions from different perspectives, with the aim of gaining the best possible understanding of the issue in question (Clifford et al., 2016, p. 9)

4.5.1 Survey

In line with McLafferty (2016, p. 129-131), surveys are commonly used in geographic research to obtain information about people's attitudes, opinions, behavior and social interaction. The questionnaire design is key when using survey as a method, both to ensure that the information

gathered is useful for answering the research question(s) but also to avoid bias and leading questions. My questionnaire was a mix of both fixed-response questions and open-ended questions in order to be able to quantify some of the basic data, but at the same time enable the informants to express their attitudes, preferences and emotions in a more free and detailed manner. Hence, the survey produced both quantitative and qualitative data.

More specifically, my survey (see appendix 1) consisted of two parts: Part one covering sociodemographic data, with questions about age, gender, level of education and main occupation. All these questions had fixed responses, and the aim was to map the user characteristic. The second part was related to their experiences with the Ecobici scheme, and consisted in three fixed response questions, seven open-ended questions and three yes/no questions where they in case of stating yes were asked to elaborate on their response in the following question (open-ended). The aim was to explore the user's personal opinions, viewpoints and experiences related to the system, as well as to map the patterns of use.

I tried to get in touch with people through engaging in informal conversations, in line with what Krueger quoted in Longhurst (2016, p. 149) refers to as "recruiting on location" or "on-site recruiting". The potential informants were approached on-site (i.e. selected docking-stations that I had previously localized), using the survey both as a mean to gather bigger amounts of data faster but also as a way of recruiting informants to in-depth interviews. For the questionnaire survey, I employed the face-to-face strategy (McLafferty, 2016, p. 134) as it is the most flexible and gives the opportunity to reveal hidden meanings and clarify vague responses.

As mentioned, I conducted a total of 90 surveys; 46 in Roma and 44 in Centro. The survey was executed on-sight, more specifically at three different docking-stations in Roma Norte and five docking-stations in Centro. The survey was applied between 11 and 17 at weekdays (Monday to Friday), with most surveys undertaken between 12 and 15.

Neighbourhoods	Roma	Centro
Ecobici-Docking Stations	134 – Alvaro Obregon-Orizaba	52 – Hidalgo-Trujano
	136 – Alvaro Obregon-Tonala	43 – Juarez-Revillagigedo
	47 – Glorieta Cibeles-Oaxaca	29 – Reforma-Bucareli
		82 – Independencia-Marroqui
		E260 -Av. Juarez-Balderas

Table 1: Docking-stations where I conducted the survey.

During the survey, I felt that my ability to gain a partial insider position was a great advantage as the informants at first seemed curious about what I was doing and why I wanted to talk to them. Being an apparent outsider hence made it easier to get in touch with people initially. When they realised that I spoke the language and had lived in Mexico for some years, and as such have a good understanding of Mexican culture, politics and history, and consequently contextual references, they seemed more comfortable talking to me. The latter was also helpful during the interviews with Ecobici-users.

4.5.2 Semi-structured interviews

Interviewing as a method spans from unstructured to structured interviews, which can be placed at each extremes of a continuum, and in the middle lies semi-structured interviews. This interview form is content-focused and the researcher employs a flexible interview guide, either structured as themes relevant for the research question or as fully-worded questions, and the interviewer redirects the talk if it runs to far off the topic (Dunn, 2010, p 110).

According to Järvinen (2005, p. 29), the data obtained during an interview is a co-production of knowledge carried out by the interviewer and the interviewee, and the interaction between them during the interview situation. In other words, an interview can be considered a meeting where at least two sets of experiences, opinions and interests are measured against each other and negotiated. An interactional approach to the interview situation requires considering the

researchers influence on the data obtained, both during the interview but also when proceeding to data-analysis.

The focus of the research is experienced-based and as such, my second main method for gathering data was in-depth interviews with a range of actors that are involved with Ecobici in distinct ways, to get an overview of different opinions, experiences and events (Dunn, 2010, p. 102). Primarily, I was interested in revealing who the users are and their respective viewpoints regarding the Ecobici-program. The interviews were conducted in public spaces of the interviewee's choice, most commonly a cafeteria. I conducted five interviews with users:

- male (26) with bachelor, working and studying
- male (45) with PhD, freelancer
- male (26) with double bachelor, working
- female (31) with bachelor, freelancer
- female (26) with bachelor, working

This sample does to a large extent represent the average user of the scheme according to my survey results. Given that the in-depth interviews with users were aimed at supplementing the survey, I have chosen to focus on the "typical" user to explore if they have differing or similar perspectives. When it comes to the high representation of the age 26 in this sample this was a mere coincidence, as the survey didn't ask for exact age. The criteria for choosing the interviewees is outlined more thoroughly in section 4.5.

Furthermore, I conducted five interviews with the following persons and entities (hereafter referred to as stakeholders), related to Ecobici in different ways. The main topic of the interview/role of the informant, are outlined in parenthesis:

- Author of the Ecobici reports (key informant/expert)
- Ecobici representative (aims and current status of Ecobici's operation)
- Former Ecobici representative (aims and challenges when implementing Ecobici)
- Bicycle mayor and activist (cycling in Mexico City in general)
- SEMOVI representatives (general mobility perspectives)

The aim of these interviews was first and foremost to address RQIII regarding intentioned and actual use of Ecobici, challenges and opportunities related to the implementation process and potential for further expansion. Speaking to the stakeholders I was also hoping to contribute to

outline the motivations and visions behind the scheme; e.g. why it is implemented only in certain parts of the city (and hereunder the socio-economic statuses prevalent in these neighborhoods), localisation strategies for the docking-stations in an integrated public transport system perspective and the development of new technologies to enhance and facilitate the user experience among other issues. I was also interested in getting a contextual overview of the general role of the bicycle in Mexico City, not only as a mean of transport but also in a more cultural and historic sense, and general mobility issues. The interviews with the stakeholder was conducted in their offices or workplace, except for the interview with the bicycle mayor, which was conducted in her home.

Regarding the interviews with the different stakeholders, I experienced that my status as a foreign researcher (or rather student) was quite established and suitable for my purposes, and hence I tried to act according to role expectations. When we started talking, I often got questions regarding my research project, for instance if I was taking my masters or doing the project in collaboration with a Mexican university, but also about my personal life: If I had Mexican kinship or similar. To some extent, I felt that these questions indicated that I did not behave according to their expectations, but that it did not affect the interview too much in either positive or negative direction. At the same time, I experienced that representing a foreign University was an asset, and that it was generally perceived in a positive way. Some of the interviewees even expressed gratitude for the academic interest in the case, and one said, “It is about time that more studies are performed and even more so if it will be written in English!” Furthermore, several interviewees expressed that they would like to read the final report.

Additionally, I conveyed two group-interviews with non-users to gain knowledge concerning the reasons behind *not* making use of the system and what it would take to convert these informants into users. One interview was conducted at lunchtime with three female employees aged 28, 28 and 29, working in the same government agency located in a neighbourhood with Ecobici coverage. They all reported education at master’s level. One of the interviewees resided in Roma, the second in a neighbourhood with Ecobici coverage west of Roma and the third in a neighbourhood without Ecobici coverage in the southern part of the city. The second interview was conducted after work hours with two male employees, both with masters, aged 30 and 37. One of the interviewees reported living and working in a neighbourhood without Ecobici coverage, and the other living and working in a neighbourhood with Ecobici coverage.

4.5.3 Field conversations

Field conversations are informal chats, more like the usual day-to-day talk between people, and are not planned. They can be categorized as part of observation or participant observation. In these conversations, the researcher tends to talk as much as he is listening, and if something interesting comes up, he can ask the person to elaborate further on the topic. Sometimes the field conversations answer questions that the researcher did not think of beforehand, and as such did not have any plans of asking about (Aase and Fossåskaret, 2014, p. 31-33).

Especially during the periods I was out on the street conducting surveys, the field conversation method came to good use. Sometimes as a door opener for asking people if they would like to participate in the survey, and at other times as informal conversations that emerged after concluding the survey. I experienced that several of the informants were eager to continue talking after they had filled out the questionnaire; clearly, the open-ended questions triggered a desire to elaborate on their responses and further discuss aspects concerning Ecobici in a more informal way. Often, these small chats revealed interesting thoughts and experiences that the survey did not cover, and as such, I found them quite useful for getting a better sense of the user's opinions. Additionally, it happened more than once that an informant would stick around for some time, giving me company in the waiting periods, and in these occasions, the conversations drifted on to broader topics such as politics, history and culture. Again, this was a useful way of getting the informant's perspective on their own reality in a more casual setting.

4.5.4 Observation (participant and non-participant)

To supplement the survey and the interviews, I engaged in some participant observation. Participant observation is, as the name indicates, a combination of observing places, practices and people whilst involving actively in a practice, group or event (Laurier, 2016, p. 169-171). The strength of this method lies in the close interaction and grounded perspective upon the places, practices and people studied. In my research context, this meant to use the bicycle scheme actively, which I did regularly throughout my stay, although to a lesser extent than I had foreseen. The aim for using this method in my fieldwork was to gain a better understanding of how the bicycle scheme is organized, by identifying patterns, norms, values and processes related to its use in a spatial context.

By entering the program as a local, from spotting the nearest customer office and reading up on the formal requirements for signing-up, fulfilling the necessary steps to get the membership,

downloading the app and starting to figure out the most convenient routes to get from A to B, I hoped to be able to understand how things are done by the locals. As stated by Kearns (2010, p. 242) the goal is to obtain contextual understanding by constructing a profound interpretation of time and place through direct involvement.

In addition, it gave me indications of the accessibility of the scheme and the possibility to observe the users and the traffic pattern. According to several of the informants in the focus groups conducted in the Ecobici surveys (López, 2012, 2015) there is a sense of community among the users' and using the bikes I hoped to get in touch with people and pursue field conversations.

Whilst undertaking the survey I also did some non-participating observation, both intentionally and un-intentionally, with the purpose of providing complementary evidence that can support the aggregated data and contribute to the interpretation of the place (Kearns, 2010, p. 242). To some extent this was something I planned on doing before I got to the field area, but it must be said that in the end it felt quite naturally, as I had a lot of dead moments in-between each informant taking the survey. What I find interesting is that even though this type of observation is a passive one, I experienced that I felt more integrated in the phenomenon I was observing than I had pictured. The idea I had beforehand was that I would sit at a café or on a bench observing the users and their context at a distance, whilst what I actually ended up doing was observing the movements at a close range. At times, this led to a change in my behavior where I, unconsciously, tried to behave in a way that would help me to be perceived as an insider. One example is that I returned from fieldwork with very few photos, as this did not feel like a natural behavior for a user of the system.

When it comes to the participant observation, I made use of the bicycle scheme to (try) to get to some of my interview appointments, as well as for non-research related transport and recreation. I quickly discovered that it was easier said than done, and at times frightening, to maneuver around the megalopolis – especially considering that I was not doing a typical commuting route, biking from the same spot back and forth. Things felt a lot easier when I was biking with a friend, as it allowed me to only focus on the traffic situation and not consider directions, route choices etc. During my solo-rides I got lost a couple of times, and I think the stress that this brought into an already unfamiliar setting influenced the decision to often use public transportation or uber for larger distances and walk when I had to travel shorter distances.

4.6 Sampling

As I was following a two-fold path during the fieldwork, the users and the stakeholder's side of my case, I worked with different sampling strategies simultaneously. Both within and across each group.

As such, my sampling strategy consisted in a mix of some of Michael Pattons quoted in Bradshaw and Stratford (2010, p. 75) strategies for purposive sampling: Opportunistic sampling, which implies being flexible and open to the unexpected, convenience sampling, which implies to select participants based on access (e.g. informants that I managed to recruit on the street), criterion sampling, which consist in selecting participants based on specific criteria (for example being involved in the policy-making processes linked to the bicycle scheme) and snowball sampling, where one contact leads to the recruitment of another contact.

As soon as I had determined the geographical delimitations for applying the survey, I went on to map strategical docking stations within the field. As mentioned, by observing both the flux of people but also the adequateness of the physical space for undertaking the survey. That said my main sampling strategy was that the people filling out the survey was either returning or taking a bike from a docking stations, in other words Ecobici-users. Summarized, I had a strategy that consisted in the following criterions for performing the survey: 1) Geographical delimitation 2) A mix of convenience and criterion sampling.

According to Longhurst (2016, p. 149) there exist various strategies for recruiting participants for semi-structured interviews. Exploratory preparation such as observation, reading and preliminary interviews often works as a starting point for mapping the perspectives of the participants that the researcher sees himself reaching out to (Bradshaw and Stratford, 2010, p. 74). This description fits quite well with my experience for recruiting interviewees on the stakeholder side. Before heading out in the field, I read the two Ecobici reports that exist and contacted the researcher in charge to schedule a meeting. She was my first interviewee in the field, and from the interview I brought valuable contact information on the stakeholder side that not only turned out quite useful concerning who to contact, it also opened doors as people tended to be more eager to answer my requests having a reference person. My first interviewee could therefore be considered a key informant, but it is also a classic example of a snowballing sampling strategy.

For recruiting users to the in-depth interviews, I made use of the survey. The last part of the questionnaire consisted in an encouragement to leave their contact details in case they were

interested in participating in a more extensive interview elaborating on the topics of the survey. To choose my interview objects among the informants that had checked off for a possible interview I established the following criteria: A gender balance reflecting more or less the results from the survey, that the informants had checked off for noting a change in their daily life after starting to use Ecobici and that Ecobici was used in combination and/or substituting other means of transport. I also wanted to interview informants from both neighbourhoods. One of the interviewees was recruited un-intentionally while I was having breakfast in a café in Roma. We started an informal conversation as we were sitting next to each other at the counter, which eventually led to the scheduling of a formal interview, and hence the only user recruited outside the survey. The informant also turned out to have connections with people working with Ecobici, but unfortunately, the potential interviews never materialized.

For the non-user group interviews, I reached out to friends that had expressed beforehand that they don't use Ecobici and asked them to bring a friend or two along for an informal chat about their impressions of the system and the reasons behind their decision to not use it. As the non-users were not contemplated as my main subject of investigation, but rather as a backdrop for a better understanding of the research topic, I did not pay too much attention to the geographical aspects of the sampling strategy for these informants – meaning that they were not recruited exclusively from the two field areas. As for the gender balance this was opposite of the one among the users, with three female and two male interviewees.

4.7 Challenges

Undertaking fieldwork, whether in a familiar or unfamiliar setting or culture, will always imply some difficulties and the first challenge I faced, and that I had not quite foreseen, was how time-consuming it turned out to be carrying out the survey. I knew that people in big cities always tend to be in a hurry, but I still thought during my pre-field planning that a couple of weeks would be enough to accomplish my goal of 100 surveys. This turned out to be easier said than done and adding the difficulties of finding a second neighborhood suitable for the research, a throat infection and the last-minute adjustments of the survey, I ended up undertaking surveys over a 5 weeks period. That said, I changed my overall fieldwork plan, which originally was to complete the survey part before I continued with the in-depth interviews and hence, I alternated between doing surveys and in-depth interviews. Moreover, I tried to approach several people working with maintenance and rebalancing of the system on-site, but they were not eager to speak to me and kept referring to the customer service.

Another challenge I would like to highlight was the process of making appointments for in-depth interviews. As already mentioned, the last part of the survey questionnaire was an encouragement to leave their contact details in case they would be interested in participating in a more extensive interview. Rather surprisingly, approximately 2/3 of the respondents left their contact details - the problems occurred when I tried to contact them later on. Some of them did not respond at all, and others would respond initially, but not at a later stage. With a third group the problem occurred when we went back and forth trying to concrete the time and place, and in some occasions, it eventually never materialized. This was also partly a problem on the stakeholder side where I, as mentioned, had tried to reach out to a few persons of interest before starting the fieldwork, with variable luck.

As I speak Spanish fluently and have lived in Mexico on several occasions, neither the language nor the culture imposed any significant barrier in the field. Nevertheless, the fact that I during the work with this thesis have been juggling three different languages have been demanding at times. Especially the translation of quotes and content of meaning from Spanish to English without losing cultural and contextual aspects relevant for the research, have posed some challenges. For instance, the Mexican slang word “franelero”, which literally translates to “a man with a flannel rag”, came up in an expert-interview and was something I wanted to include in the analysis to illustrate resistances that emerged throughout the implementation of Ecobici. This word refers to a person that dedicates himself to help people park their cars and keep an eye on it in change for a tip, a very common form of informal work in Mexico and hence a term most people know of, but not at all a familiar or intuitive concept in a different context. The first phases of the work were executed in Norwegian, before I finally made the decision to write the thesis in English. All the fieldwork, transcribing, coding and interpretation of data material was undertaken in Spanish.

Before I move on, I would like to add a few more experiences and observations that I consider might be more specifically linked to my positionality in the field:

As my survey-result shows, there was an overweight of men using the bicycle scheme. Nevertheless, I experienced that men were more eager to participate in the survey than women were. Men were more likely to approach me on their own initiative, whereas women expressed scepticism and at times tried to avoid me. I tribute this to my status as a foreign, female as this often, and unfortunately, draws the attention of local men. Hence, I cannot rule out that this has influenced the results.

Secondly, I would like to pinpoint that when I conducted interviews with users and non-users, they took place in cafeterias where I offered to pay for their coffee, but male and female informants alike consequently rejected this. People rejected my offer politely but determined, which gave me the impression that having me to pay for their coffee would be an expression of economic weakness: “I am perfectly fine paying my coffee without your help” and an acceptance of the (imagined) asymmetric power-relation related to my status in the field. In more general terms, refusing to accept my invitation to pay for the coffee seems to be linked to a strong sense of pride and politeness.

When it comes to possible differences between the two neighbourhoods, I did not feel that my status was considerably different when talking to the informants. The only notable difference I would like to highlight is that I felt a bit more alienated in Centro, as people were more openly staring at me, saying: “What on earth is this girl doing?” I even felt at times that police officers and security guards in Centro kept an eye on me, whilst in Roma people did not seem to be much affected by my presence. I attribute this difference to the two neighbourhoods differing profiles. Although both neighbourhoods experience the presence of foreigners, their status tends to be a bit different. Where Roma is a favourite among young foreigners residing in the city, Centro attracts more tourists.

4.8 Data analysis

The data collection process may be considered a messy process with a lot of challenges and unexpected tosses and turns, but these words might as well be suitable for describing the process of analysing the data. A common feature of qualitative research is that it produces a lot of data, in my case a mix of recordings from interviews, notes from observation and questionnaires from the survey, which might not be intuitively easy to make sense of. In order to make the data more approachable and facilitate the process of analysis, it is therefore recommended to find a way of abstracting the data, for instance through coding (Cope, 2010, p. 284). Stake (1995, referred to in Taylor, 2016, p. 590) claims that the process of analysis is a refined version of our common everyday practice of trying to make sense of the situations and events we experience.

After returning from the field, I used a considerable amount of time on systematising and digitalising the physical questionnaires. To get an overview of the socio-demographical information in the dataset I did a basic quantitative analysis of the questions regarding age, education, occupation and use-frequency. For the open-ended questions, I used a spread-sheet in excel where I coded the answers based on their thematic commonalities, e.g. answers coded

in yellow referred to economical, blue to practical and green to environmental reasons for using Ecobici, with the aim of identifying different categories of meaning. According to Cope and Kurtz (2016, p.648) coding refers to a set of processes used to structure the data, establish analytical systems, finding patterns and constructing categories that can help connect empirical discoveries with broader literature. After coding all the answers to the open-ended questions, I went through them once again to make sure the categories were covering the different aspects present in the data material, and to assure their adequacy in terms of enabling me to answer my research questions. Afterwards, I made a quantitative analysis in excel to get a grip of the distribution between the different categories.

The concept of categories can be pictured as mental boxes which serves both for arranging and making sense of the data, and hence we can consider them cognitive categories. Given that cognitive categories are established by the researcher and combines the objective observations and the subjective ways the observer makes sense of the world, the categorisation process will be influenced by the researcher's culture and position (Aase and Fossåskaret, 2014, p. 111-113). In the context of my fieldwork, this means that the categories I established and the way I interpreted the data, might not harmonize with the viewpoints of the informants. I think the fact that I had previous experience with the culture of my field area, awareness of the possibility of different perceptions and that I chose to perform the survey face-to-face, have contributed to avoid important discrepancies in the process of analysing the data. That said, I experienced that surprisingly few informants answered 'walking', when responding to a survey question concerning substitution of means of transport. This might indicate that what I put into the cognitive category of 'mean of transport' (any way of getting from A to B) did not correspond with the informant's categorization of the concept, but it might also be the case that this kind of substitution were rare.

The 12 interviews were recorded and hence a lot of time was spent on transcribing them. I started out by transcribing word by word, but after realising how time consuming this was, I changed strategy and began to do write down main topics and the time. As the aim of the in-depth interviews was to broaden the perspective, e.g. outline stakeholder perspectives and get more nuanced user narratives, I did not codify them in the same way as the questionnaires. Instead, I read the transcribed interviews and marked sentences, quotes or words with relevance for the research questions in bold letters.

4.9 Ethical issues

Even if a research project does not investigate topics that could be considered ethically challenging in their own sense, as a researcher in an unfamiliar context one will always have to be aware of and reflect upon his position and the integrity of the informants and the research area. As such, all studies based on research should include a section dedicated to the ethical aspects of the study (Busch, 2013, p. 62). The core values of conducting ethical research is justice, beneficence and respect. This means that the researcher should pay attention to the distribution of benefits and burdens, maximise benefits, minimize physical, emotional, economic and environmental harm, and assure that the informants and the field area are treated with respect (Hay, 2016, p. 33).

Firstly, I reported my research project to NSD (Norwegian Centre for Research Data), and had it accepted before I went into the field. I informed all interviewees that the information they provided in the interview would not be possible to trace back to them, and that I was the only person with access to the information. I always asked for permission to record the interview. To secure an informed consent, i.e. making sure that the interviewees knew exactly what they were saying yes to, I always spent the first minutes of the interviews on explaining the aim of my research project, what kind of issues I were looking into and what I expected from them (Dowling, 2010, p. 29). Regarding the questionnaire applied in the survey, I included an introductory paragraph with information about the aim of the survey and anonymization of the data. I also informed the informants orally about their possibility to withdraw from the study at any point without further explanations. To avoid any negative impact on the informant's activities I approached them by asking if they had 5 minutes to spare.

To prevent negative consequences from the interviews, e.g. in terms of invading the informant's privacy or stealing too much of their time, I was very flexible regarding time and place for conducting the interviews. Hence, it turned out that the stakeholders preferred to make appointments during office hours and in their respective workplaces, whilst users and non-users mostly preferred to do the interview outside office hours or during their lunch break, in a café of their choice. In both of the group-interviews with non-users, one of the informants were friends of mine, and this could potentially be an ethical dilemma. To avoid any biased or preferential treatment I decided to play out the role as researcher, treating all the informants in the exact same way, leaving any personal topics or comments out of it until the interviews were finished.

In order to avoid any negative repercussions for the informants I have anonymised all information and sayings in this thesis. Quotes might have suffered smaller alterations in order to make them grammatically correct, but this has not affected the content. Some of the informants expressed interest in reading the final report, and I will therefore send the thesis to those who expressed such interest.

4.10 Data quality

All decisions related to the methodological approaches in a study will affect the quality of the study and consequently determine the reliability of the results. Hence, three key concepts need to be addressed and discussed to allow for an evaluation of the data quality of a research project; reliability, validity and transferability (Busch, 2013, p. 61). According to Busch (2013, p. 62) reliability refers to the quality of our measurements, how well do we measure what we measure, in other words if we can trust the data retrieved. Validity concerns the degree of accuracy, meaning if we actually measure what we intend to measure, and hence if the data obtained is valid for our research question. Ultimately, transferability is related to the possibilities of transferring our results to other contexts or situations.

Qualitative studies are characterised by the lack of opportunities to draw two lines under the answer, and the possibility of ensuring data quality has been questioned due to the prominent role of the researcher's analysis and interpretation of the data. That said, Mullings (1999) argues that the researcher's degree of reflexivity, i.e. awareness of how her thoughts, behaviour and positionality affects the research, is key to ensure the data quality in qualitative research. As such, these were aspects I constantly revisited and reflected upon, both throughout the fieldwork and during the phase of data analysis.

4.11 Limitations

The biggest limitation to my study is evidently the number of informants and the (limited) geographical areas I covered, which again is linked to the limited timeframe of the research project. That said, I felt I reached a saturation point after a while, meaning that the answers I got, tended to repeat themselves. The second limitation I would like to highlight is the lack of generalizability of the study, again related to the geographical limits and sample size, but also possibly due to the time of the day the survey was conducted. The months of June and July is part of the rainy season in the Mexico Valley, which implies heavy rainfalls in the afternoon. Ideally, I would have conducted the survey in the late afternoon when people are leaving work

and possibly have a moment to spare, but due to the rain I was forced to undertake the survey mainly between 10 am and 4 pm. Approaching people in the morning didn't seem like a viable option as people are busy getting to work/school or other obligations. It occurs to me that the time of surveying may have biased the results, namely that the informants I had access to have the possibility to use the bikes during official office hours. The profile of the persons that participated might therefore have influenced the results of the data production, e.g. they do not work full-time or their main occupation is being a student.

A third limitation I would like to highlight is the characteristics of the neighbourhoods I was able to access. As already mentioned in the context chapter the coverage of the Ecobici system is rather centralized, but still there exist bigger differences between the neighbourhoods with Ecobici coverage than the ones I felt comfortable entering as a solo female researcher. This mainly had to do with higher crime rates and safety issues, but also an increased risk of exposure to unwanted attention in the less privileged neighbourhoods. I would therefore like to reiterate that the study might not be transferable to the Ecobici user population as a whole. Rather, it gives a glimpse of motivations, experiences and opinions present among a sample of users, selected according to the above-mentioned criterions.

4.12 Secondary data

I have used data from the reports “Encuesta Ecobici 2012, principales resultados” and “Encuesta Ecobici 2014”, both for triangulation purposes and with the aim of detecting potential changes over time. The report from 2012 is based on a survey consisting of open-ended questions which was applied face-to-face to 1000 Ecobici users (López, 2012). The survey from 2014 consisted in questions with fixed response and were conducted online, with a total of 960 respondents (López, 2015). Given these methodological differences and recommendations from those responsible for the surveys concerning their validity, I have chosen to focus on the results from 2012 when comparing findings to my research.

5. Findings

The aim of this chapter is to present the results and outline the main findings from the data obtained through the fieldwork, focusing on the aspects which directly and indirectly contributes to answer the research questions. To make it easier to navigate, I have organized this chapter in four sections. The three first ones corresponds to the sub-research questions, whilst the fourth ties the findings from the three former sections together with the aim of answering the main research question. At the end of each section, there is a short summary of the most important findings. All the pie charts in this chapter are derived from data obtained through the survey.

5.1 User characteristics and motivational factors

In this section, I will explore the user's characteristics. Socio-economic aspects such as age, gender, education and occupation will be outlined, as well as how the informants got to know about the scheme and car and/or bike ownership. Furthermore, I will explore their motivations for using Ecobici. Through analysing and discussing results from the survey, observations and interviews with users, I seek to answer *RQ1: Who are the users and what are their main motivations for using Ecobici?*

I used the first few days in the field area mainly to map docking stations suitable for conducting the survey. At the same time, I tried to get a picture of the user's characteristics and a general overview of Ecobici's distribution and operation. Although the users did not appear to me as a strictly homogenous group, a few aspects caught my attention: The gender distribution appeared quite skewed, with a clear majority of men using the scheme. Secondly, I observed that the age span seemed to be concentrated in the range from 20 to 40 years, approximately. Furthermore, I witnessed that the users were dressed in clothes ranging from casual to formal, but that virtually none of them wore sportswear. Their appearance suggest that the majority are using Ecobici as a mean of transport and not for leisure purposes, but this might be subject to my fieldwork being performed on weekdays.

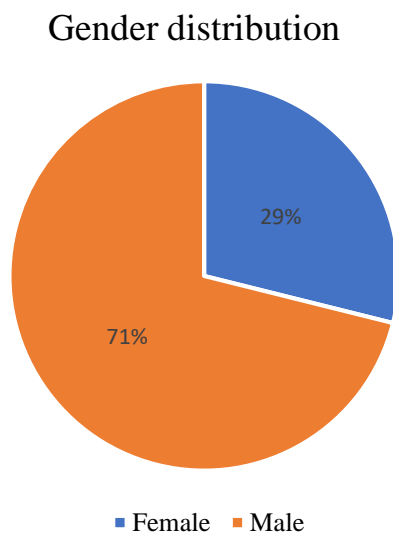
The survey results do largely corroborate these observations. 7 out of 10 users in this study are men and half of the informants are between 18-30 years old. If I widen the age span to 18-45, it covers more than 4/5 of the informants. Furthermore, three quarters of the informants have work as their main occupation and 87 % has higher education at least on bachelor's level. Interestingly only 16 % of the informants state that they only own a car, while 27 % only own

a bike. When it comes to the motivation for using Ecobici, convenience emerges as the most prominent factor.

According to a former Ecobici representative, cycling emerged as an attractive alternative among certain social groups, as it proved more practical, fast, comfortable and efficient. The insufficient quality of other mobility alternatives encouraged users to realize parts or complete journeys by bike. That said, he argued that having the option of moving by bike is a privilege. You need to live in or frequent central parts of the city, often referred to as “la burbuja” (the bubble) which are privileged areas in terms of transport, development and mobility, which enables transport by bike through equipment, infrastructure and calm traffic.

In the next sections, I will outline and discuss more thoroughly the informant’s socio-demographical characteristics as well as the motivational factors behind their decision to use the bikes and how they got to know about the system.

5.1.1 Gender



n=90, Roma n= 46, Centro n=44.*

Roma: F: 28 %, M: 72 %. Centro: F: 30 %, M: 70 %.

* For simplification purposes, I will from now on write Roma for short when referring to my field area Roma Norte.

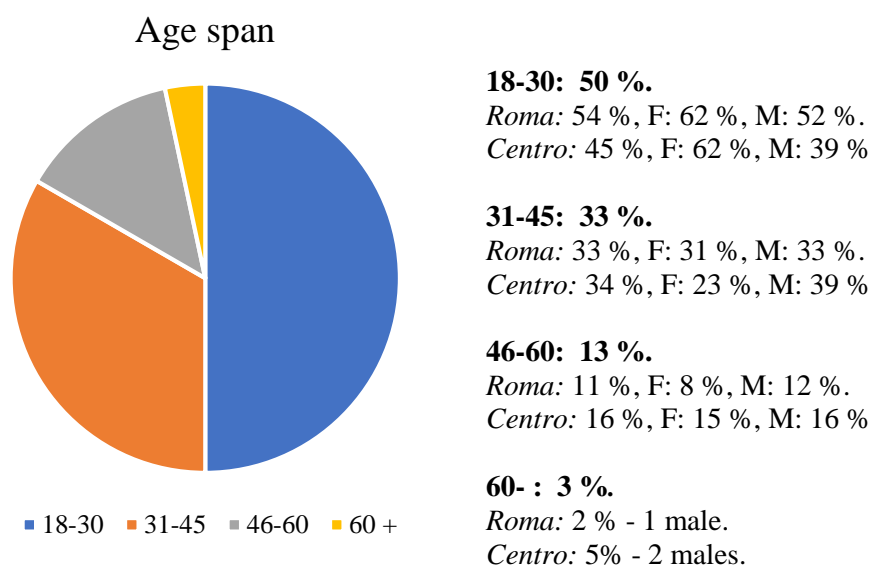
The results strongly indicate that the majority of users are men (71 % of the informants in the date set) and as the numbers show, the gender distribution is close to identical across the two neighbourhoods. These findings harmonize with my observations, but my experiences in the field as well as secondary data from the Ecobici reports, leads me to think that the results in my study are a bit skewed. As mentioned in the methodology chapter it turned out to be more difficult to get female informants, possible due to my position and consequent status in the field

(see chapter 4.7), something which may have influenced the results of my study. That said, my data coincides to some extent with the two Ecobici reports that has been published so far, which shows that in 2012 63 % of the users were men and 37 % women (López, 2012). The same numbers for 2014 were 62 % men and 38 % women (López, 2015).

Assuming that the scheme has a larger share of male users, it draws my attention to explore the possible causes to this uneven distribution. In the case of Mexico City it is easy to draw the link to social and cultural structures. The Mexican society has historically been characterized by patriarchal structures, which again has given rise to a widespread machismo-culture. Even if the machismo has been facing rising resistance in recent years that gradually is paving the way for change it is, regrettably, still a rather present feature in Mexico. One male interviewee explained that girlfriends of him had experienced sexual harassment from car drivers using Ecobici, while a female informant cited in one of the Ecobici reports expressed that the security that Ecobici gives you compared to the sexual harassment experienced in public transport is an important incentive for female users (López, 2015).

Hence, to draw a conclusion based on the assumption of a machismo-culture leading to a larger share of male users in the Ecobici scheme might be an undesirable short cut and might even be a fallacy. More aspects need to be explored to outline (other) aspects that possibly influences the distribution, for instance the gender distribution and causes within other shared bicycle schemes.

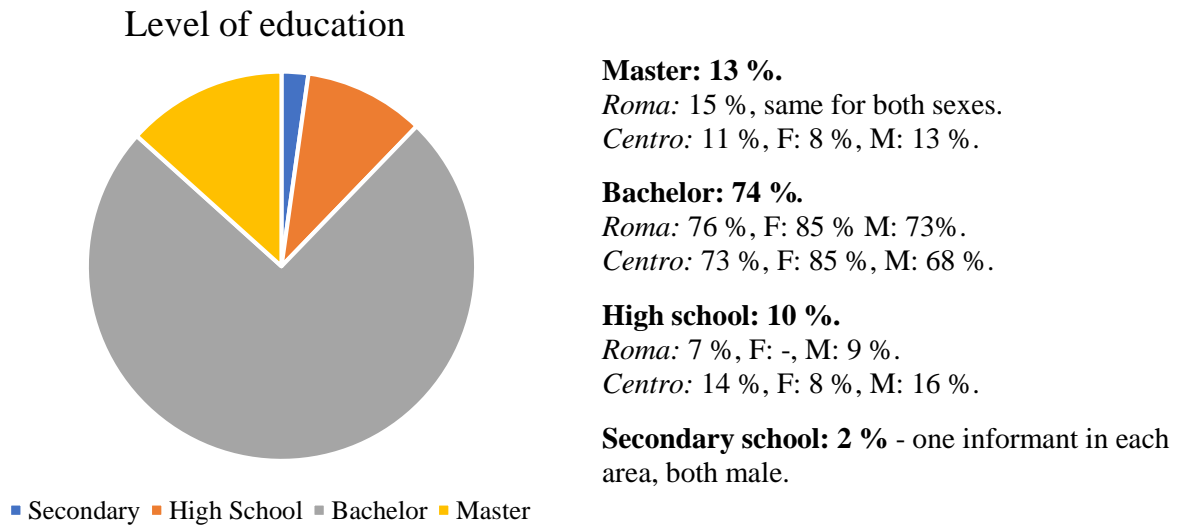
5.1.2 Age



In relation to the users' age, there is a very clear predominance of people in the age span between 18 and 45. The two groups combined constitutes 83 % of the informants, which matches my observations quite accurately. The distribution is roughly the same in both neighbourhoods, but there is generally a higher percentage in the age span 18-30 among the female informants. As for the group 60 + there were only one informant in Roma and two in Centro. All of these were male. These numbers clearly indicate that Ecobici mostly caters for younger adults (the minimum age for registering is 18). In comparison, results from the Ecobici reports show that 72 % of the informants were between 18 and 39 and 18 % aged between 40 and 49 (López, 2012).

This distribution might not be surprising, given the scheme's urban and young image, reflected in the use of communication channels such as Instagram, WhatsApp, Facebook and Twitter, online registration and an app which monitors bike availability in real-time. Nevertheless, I had expected a higher share in the group of 46-60. Only 13 % of the informants are located within this group, with a slightly higher number in Centro (equal numbers for both sexes), while in Roma there is a higher percentage among men. Given that it is possible to register at assigned modules, and that the system is not dependent on the use of mobile devices as you pick up a bike using your membership card, technical barriers should not be a hinder for less technically accustomed generations. This was confirmed by one informant stating that "You don't need internet connection to pick up or return a bike" (female 30, Centro). As such, I wonder if risk aversion or cultural conditions influence the age distribution and if the pattern is similar within other schemes.

5.1.3 Education



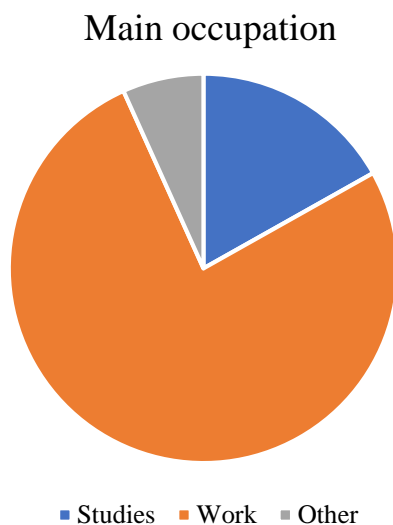
The data set shows that most of the informants have higher education, with 3 out of 4 reporting that they have or are currently studying a bachelor's degree and 13 % that they have or are currently studying a master's degree or more. The numbers do not vary significantly between the neighbourhoods, but there are a slightly higher percentage with higher education among informants in Roma. For bachelor level, the numbers are higher among female informants in both neighbourhoods, and for masters the overall number is slightly higher in Roma with no difference between the sexes, whilst in Centro there are more men reporting that they have a master or more. In Roma, there are only male informants (4) that report that they do not have higher education, whereas in Centro one woman and six men reports the same.

In the Ecobici reports 60 % of the informants was identified to have a bachelor, and 17 % held a master or more (López, 2012) (in 2014 the numbers were 58 % with bachelor and 35 % with master or more (López, 2015)). Taking this into account, I think it is quite safe to conclude that the average user of Ecobici has higher education, but the interesting question is why this is the case.

It is natural to think that this is strongly linked to the coverage of the scheme, which as mentioned earlier is concentrated in central parts of the city, and the living costs of these areas. People without higher education often live in the suburbs and consequently don't have access to the scheme where they live. Nevertheless, due to lack of work opportunities in the suburbs they often spend a lot of time commuting from the outskirts to the inner city, using multiple means of formal and informal transport. These results might indicate that Ecobici does not

appear as an attractive alternative for the last (and/or first) trajectory of their daily journeys. This was mentioned in an interview with Ecobici representatives as one of the aims for the scheme, in order to reduce congestion in downtown. It is plausible to imagine that living in a neighbourhood without Ecobici coverage makes the threshold for signing up for the service higher, as people are not familiarized with the system through their daily environment.

5.1.4 Occupation



Work: 76 %.

Roma: 85 %, no significant difference between the sexes.
Centro: 66 %, F: 77 %, M: 61 %.

Studies: 17 %.

Roma: 13 %, F: 15 %, M: 12 %.
Centro: 20 %, F: 8 %, M: 26 %.

Other: 7 %.

Roma: 2 % - one male.
Centro: 11 %, F: 8 %, M: 13 %.

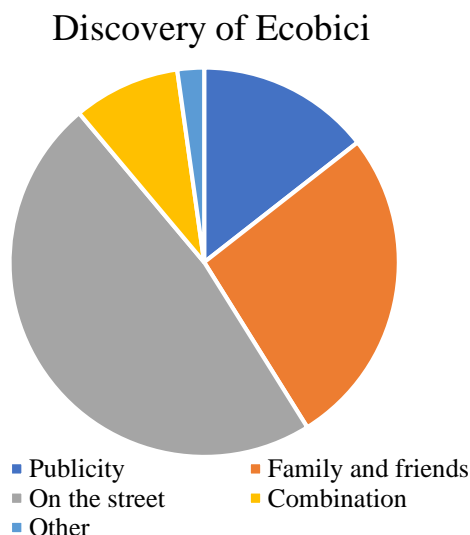
One female informant in Centro stated “quehaceres de la casa” (household chores) as main occupation.

The findings presented so far indicate that Ecobici users are likely to be younger male adults with higher education. Furthermore, the survey results show that they probably are working, as 76 % of the informants stated work as their main occupation. A few informants checked off for more than one occupation, but in those cases I rectified with them directly what they considered their main activity and hence combined answers are not considered.

The percentage stating work as main occupation is considerably higher in Roma (85 %) than in Centro (66 %). In Roma, there is no significant difference between the sexes whereas in Centro the percentage is higher among women. Generally speaking, 17 % of the informants reports that studies are their main occupation. In Roma, this number is a bit lower, with just small variations between the sexes, while this number rises to 1 of 5 in Centro with an even higher percentage among male informants. This might be transferable to the wider Ecobici-population, but the features of the areas where the data was collected might also have influenced the data obtained. For instance, there were not any important institutions of higher education in close proximity to any of the docking-stations where I conducted the survey.

However, in the Ecobici-report from 2012, 83 % reports having work as main occupation. In the 2014 report, this percentage had increased to 87 % (López, 2012, 2015). Hence, it seems that the majority of Ecobici users have work as their main occupation regardless of sampling area. Furthermore, the bicycle mayor outlined that the initial marketing of the system seemed to be aimed at “men in suits working in Reforma”. That said, it is worth mentioning that the biggest and most prestigious universities in Mexico City are situated outside the inner city and hence do not have Ecobici coverage. Again, it seems like the geographical location of the scheme influences the user characteristics, and I find it interesting to explore if this harmonises with shared bicycle schemes in other cities.

5.1.5 How do users get to know about the system



Saw them on the street: 48 %.
Roma: 46 % , F: 62 % , M: 39 % .
Centro: 50 % , F: 54 % , M: 48 % .

Family and friends: 27 %.
Roma: 24 % , F: 23 % , M: 24 % .
Centro: 30 % , F: 38 % , M: 26 % .

Publicity: 14 %.
Roma: 17 % , F: 15 % , M: 18 % .
Centro: 11 % , F: - , M: 16 % .

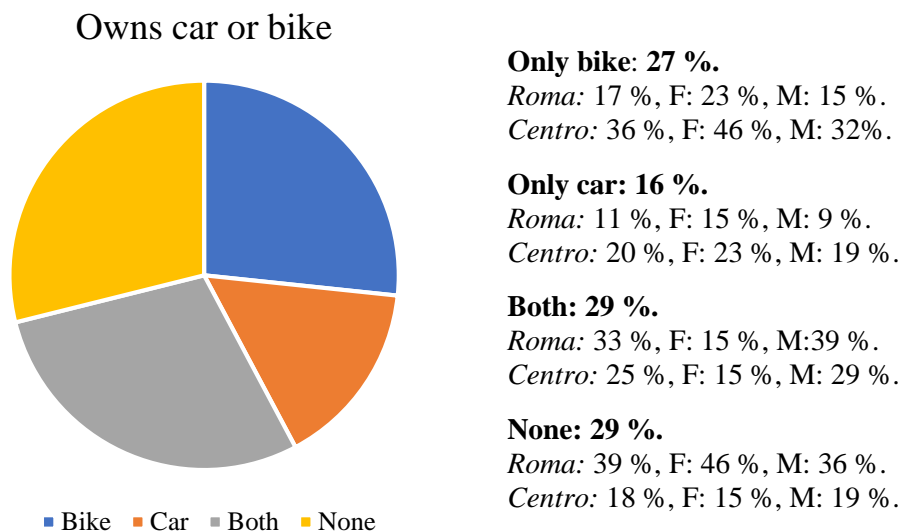
Combination: 9 %.
Roma: 11 % , F: - , M: 15 % .
Centro: 7 % , F: 8 % , M: 6 % .

Other: 2 %.
Roma: 2 % - F: - , M: 3 % .
Centro: 2 % , F: - , M: 3 % .

As the numbers clearly indicates, the most common way to get to know about the system are the option “saw them on the street”, with almost half of the informants, followed by the option “family and friends” with 27 %. 14 % stated “publicity”, while approximately 1 out of 10 informants state a combination of several options or “other”. There are not any significant differences between the two neighbourhoods, but a slightly higher percentage has stated publicity in Roma (17 %) compared to Centro (11 %). For the option “family and friends”, the percentage is higher in Centro (30 %) versus Roma (24 %). Interestingly, in Centro almost 4 out of 10 female informants report family and friends, whilst none states publicity as the way they got to know about the system, whereas in Roma the numbers are 23 % and 15 % respectively.

This distribution suggests that to live in or frequent areas with Ecobici coverage impacts people’s knowledge of the system, given that it is the most usual way of getting to know about it.

5.1.6 Car and bike ownership



The distribution among the informants are surprisingly even when it comes to ownership of bike and/or car. One third of the informant’s states that they own both, whilst the same number indicates that they own neither. Worth noting, is that the least stated option is to own only a car.

However, what I find most interesting is the significant differences between the neighbourhoods. In Roma 17 % states that they own only a bike, whilst in Centro the percentage is 36 %. When it comes to only owning a car the number is 11 % in Roma and 20 % in Centro, while nearly 4 out of 10 informants in Roma states they own neither compared to 18 % in Centro.

Another interesting aspect are the differences between the female informants. Almost half of the female informants in Roma states that they own neither a car nor a bike, the number being 15 % in Centro. Nearly 50 % of the females in Centro reports owning only a bike, while in Roma the percentage is 23.

It is tempting to suggest that the substantial differences between the neighbourhoods might be related to their different socio-economic and commercial profiles, which might influence the crowds they attract. According to my observations, Roma has a predominant young and urban profile with many co-working cafes, galleries, residencies targeting young professionals,

restaurants and bars. Many residents of the area work close by, for instance in corporates in Avenida Reforma, and often moves between adjacent neighbourhoods. Furthermore, the area offers a wide range of transport options and these factors combined might explain the high percentage of people who does not own either a bike or a car, it is not considered necessary or adequate for their “urban lifestyle”.

As presented in the context chapter, Centro has a lower socio-economic status than Roma and a more mixed environment with museums, governmental buildings, residencies and commercial activity. Interestingly, none of the informants I recruited for an interview from the docking stations in Centro reported to live or work in the area (in Roma 2 of 3 interviewees reported to live there), which might indicate that Centro represents an area that people visit for certain purposes and that they live in areas where it is perceived as more necessary to own a bike, car or both.

5.1.7 Motivation for using Ecobici

Ecobici was installed in my former neighbourhood Polanco (..) it made it easier for me to go to Condesa, as it was way more efficient than taking the bus or metro where I would have to transfer.

(male 26, Roma)

The categorization of the answers to the question “why did you decide to sign up for Ecobici?”, turned out to be a bit trickier. Both given the wide range of answers stemming from its open-ended format, but also since there certainly are several ways to make such a categorization. Additionally, it is one of the key questions of the survey in terms of being able to answer sub-research question I: “*Who are the users and what are their main motivations for using Ecobici?*” Hence, I have tried to make clear and self-explanatory categories that in a clear manner outlines the main driving forces behind the informant’s decision to make use of the service, whilst avoiding too many categories. In case of multiple answers which comprises several categories I have decided to place it in the category fitting the first answer, both to make the data more approachable but also because it highlights the reason that first comes to mind. The only exception is the environmental category, where answers have been classified in this category even if it is not the first answer. This decision was made because the program was launched within the “Plan Verde” initiative and that Ecobici is operated by the city’s Ministry of Environment (SEDEMA).

- **Convenience: 58 %.** *Roma:* 65 %, F: 69 %, M: 64 %. *Centro:* 50 %, F: 54 %, M: 48%.
- **Economic: 16 %.** *Roma:* 11 %, F: 8 %, M: 12 %. *Centro:* 20 %, F: 15 %, M: 23 %.
- **Environmental: 12 %.** *Roma:* 9 %, F: 15 %, M: 6 %. *Centro:* 16 %, F: 23 %, M: 13 %.
- **Other: 9 %.** *Roma:* 13 %, F: 8 %, M: 15 %. *Centro:* 5 %, F: 8 %, M: 3 %.
- **Exercise: 3 %.** *Roma:* -. *Centro:* 7 %, F: -, M: 10 %.
- **Necessity: 2 %** (1 male informant in each neighbourhood).

The distribution in percentage clearly shows that the most prominent motivational factor is related to convenience aspects of Ecobici (58 %). This category comprises features such as Ecobici being efficient, practical, fast and easy to use, and that it provides an attractive alternative to mobility in the city. Some of the answers listed by informants where: “The public transport is very deficient; you avoid traffic jams and it’s more fun!” “I can get around the city faster than walking and without taking a car”. “The practicality of a bike and a place to leave it when I arrive at my destination”. Amongst the informants in Roma, the convenience aspect is even more prominent, with 65 % versus 50 % in Centro. There are only small variations between the sexes.

The second most listed aspect is the economic (16 %). Here there is an interesting difference between the neighbourhoods, with 1 out of 10 informants in Roma and 2 out of 10 in Centro falling into this category. As for the environmental aspect this is mentioned by 12 %, with a higher rate in Centro (16 %) compared to Roma (9%), and among female informants with 23 % and 15 %, respectively. Exercise is mentioned as a main motivation by 10 % of the male informants in Centro, but not by any other informants. Lastly, 9 % fell into the category “other” and 2 % stated necessity.

Although I am not surprised that most of the users point out the practical and time-saving aspects of Ecobici as their main motivation for using the scheme, I find it interesting that only 16 % reports that economic aspects are their main motivation for using the scheme. Given that the scheme is public and heavily subsidized by the government, it is natural to think that this is intentioned as a pull-factor for (new) users. If I extend the group to also include users who have mentioned economy as one of several motivational factors, the percentage is 32. Hence, the numbers clearly indicate that economic reasons are not a main motivation for using the bikes, but for approximately 1 of 3 informants it is the first or one of several factors that motivates them to use the scheme, which again might be linked to the socio-economic profile of the actual

users. As the numbers show there is a higher percentage in Centro (20 %) than in Roma (11%), that states that economic aspects are their main motivation for using Ecobici. This difference might be linked to the socio-economic profiles of the two neighbourhoods. If I separate the users who mention economy as one of several factors (but not as the first), the distribution is quite even with 16 % and 15 % in Centro and Roma respectively.

Some of the same could be said for the environmental aspect. As mentioned, the Ecobici scheme was launched as part of the Plan Verde-initiative and is still subjected to SEDEMA, which might be considered as an indication of the view of the scheme as an environmental measure. 12 % of the informants reports environmental causes as one of their motivations for using the scheme, whilst this number is reduced to only 1 % if I only consider the informants who mentioned it as their main motivation. That said, having another motivation for using Ecobici does not remove potential positive environmental effects. It can therefore be regarded as one of several arguments for rethinking the administrative belonging of the scheme. In my point of view, it would most definitely be more natural to locate the scheme in a (green) mobility context, especially taking into account the strategy of placing the bikes in close proximity to metro-stations and commuting hubs.

5.1.8 Summary

Considering the aspects analysed so far, you could say that the average Ecobici is a male with higher education, aged from 18-30, who got to know about the scheme by seeing the bikes on the street. His main occupation is work and it is equally probable that he owns a car and a bike as the probability for him owning neither. His main motivation for using Ecobici is most likely linked to convenience aspects.

I find it rather interesting that this description fits more or less exactly the notion I had before heading out in the field and the observations I made initially. Additionally, this finding makes me more eager to explore the concordance between the intentioned use and actual use. Not only in terms of purpose of use, but also in relation to a possible target group and the actual users of the scheme.

5.2 Attractiveness, constraints and opportunities

I differ from a lot of people who say that there is not a bicycle culture here. It's not that there is no bike culture, the main problem is that this is the kingdom of the car.

(male 45, Roma)

In this section, I will explore the informant's thoughts and opinions regarding advantages and aspects that calls for improvement within the Ecobici scheme. Furthermore, I will explore barriers for using the system as well as impacts on the user's lives related to Ecobici use. Through analysing results from the survey, observations and interviews with users and non-users and stakeholders I seek to answer *RQII*: *"How attractive is the scheme for the city's inhabitants, and what are the most prominent constraints (and opportunities)?"*

Through my observations performed in the field, I noticed that the docking stations are placed in close proximity to each other, giving the users the opportunity to walk to the next with ease in case the station of their choice are empty or full. This seemed to happen somewhat frequently, despite what I perceived as a constant flow of rebalancing trucks in circulation. I also experienced that the app was not always accurate in terms of showing the number of available bikes and return spots, as well as docking stations that were temporarily out of order.

On several occasions, I observed users having trouble with either picking up or returning a bike. In many cases, this solved itself or the user simply left to find another docking station. Nevertheless, I experienced seeing users who called the customer support to fix the problem and this was something I also had to do myself on one occasion. Through field conversations, I got the understanding that being charged erroneously for additional minutes, or in worst case for the disappearance of a bicycle, was not an uncommon event and hence the main reason for contacting the customer support. According to the users, these problems usually occurred due to a faulty return of a bike mainly caused by technical issues with the system. Some of the informants expressed discontent with the customer support related to long waiting time and tedious processes of problem solving considering that they often are in a hurry.

5.2.1 Resistance

Conversations with a former Ecobici representative revealed that the scheme faced resistance among neighbours in the period prior to implementation, as well as throughout the expansion phases:

When Ecobici was launched a lot of people said that it was not going to work. Primarily because we weren't a European city, that the bike wasn't going to work here, that nobody was going to use it..generally speaking, these were the main resistances.

(Ecobici representative)

The former representative further outlined that neighbours were invited to open meetings before the installation of Ecobici. Their first reactions were related to lack of familiarity with the system, a natural reaction given that it was the first of its kind in Mexico. In Condesa, people expressed concerns related to the replacement of public parking spaces by docking stations. In Centro, merchants who were used to reserve public parking spaces for their clients and felt that being unable to offer parking would affect their business. In one occasion, they even threatened Ecobici representatives with knives to make them retire. In Polanco, rich families were opposing the implementation of docking stations due to their perceived ownership of the public parking spaces in front of their residencies.

As outlined, there were many different types of resistance, but the common factor is that they were related to the appropriation and use of the public street space and the perception of the car as a symbol of success, economic improvement and quality of life.

Furthermore, the implementation of bike lanes was highly conflictive in certain areas. Around Parque Mexico located in Condesa, residents used to reserve part of the public road and lend it to “franeleros”, informal parking wards that charge you a small amount of money to look after your stationed car, for a fixed monthly price and hence were angered by the installation of docking stations due to their income losses. Several and at times heated meetings were held to outline that these spaces are public property and consequently subject to public mobility disposition, seeking to remove parking spaces that obstructs the mobility to ensure the safety of cyclists.

In general terms, the former Ecobici representative perceived the process of making a public scheme favouring cycling as a contested process both politically and among the citizens. Partly this was due to the stigmatization of the bike as a vehicle of poverty that opposed the car supremacy. Surprisingly even people that didn't own a car was against the project, as they felt that they would acquire a car further down the road and that Ecobici hence would represent an obstacle for them in the long term.

On the other hand, he stressed that processes of citizen participation were generated, also among people who were negative. Ecobici represented a way of involving people in social projects, exchange of ideas and creation. It is uncertain how much incidence they got among people, but it sparked interesting reflexive processes and perhaps initiated a change towards perceiving the bike as a symbol of life-quality, liberty and innovation instead of poverty. These reflections were supported by the bicycle mayor, who emphasised the role of the bike as a tool for rethinking politics, social movements, citizen involvement and decision-making processes. She further stressed that one of the most important achievements of Ecobici in its early phase, was to break the prejudice of the bike as a transport mean for poor.

5.2.2 Advantages with Ecobici

I use Ecobici because I save money, pollute less, improve my health (...) but I live in a privileged neighbourhood and have a privileged salary compared to other people.

(male 45, Roma)

The answers to the question regarding advantages with Ecobici was categorized in the following way (if there were several answers I have chosen the category that fits the first listed answer, except for the category “environmental” where answers were placed in this category even if it wasn’t mentioned as the first):

- **Convenience: 42 %.** Roma: 50 %, F: 54 %, M: 48 %. Centro: 34 %, F: 38 %, M: 32 %.
- **Environmental: 26 %.** Roma: 17 %, F: 23 %, M: 15 %. Centro: 34 %, F: 31%, M: 35 %.
- **Economical: 13 %.** Roma: 11 %, F: 8 %, M: 12 %. Centro: 16 %, F: 15 %, M: 16 %.
- **Exercise: 11 %.** Roma: 11 %, F: 8 %, M: 12 %. Centro: 11 %, F: -, M: 16 %.
- **Security: 6 %.** Roma: 7 %, F: 8 %, M: 6 %. Centro: 5 %, F: 15 %, M: -.
- **Other: 2 %.** Roma: 4 %, F: -, M: 6 %. Centro: -.

When it comes to the advantages of Ecobici, the most prominent feature again turns out to be the convenience aspect, related to e.g. reduction of time spent on transport, practical features and user-friendliness, with 42 % of the informants. This aspect stands even stronger in Roma with 50 % compared to 34 % in Centro, and there is no significant difference between the genders. Approximately 1 out of 4 has mentioned advantages related to the environment, and the pattern from the question about motivations for signing up repeats itself, with 34 % stating environmental aspects in Centro vs. 17 % in Roma. 1 out of 10 informants report exercise as

the main advantage, whereas 6 % highlights security, here implying that they do not have to worry about the bike getting stolen. 2 % fell into the category “other”.

Once again, practical and time-related aspects stand out as the most important advantage. In total, 42 % of the informants mentioned it as their first answer, and as much as 71 % mentioned it among other answers. Perhaps not so surprisingly, there are more informants stating that environmental aspects are an advantage (26 %), than informants stating that it is a motivation for using the scheme (12 %).

That said, if I only consider those who have mentioned environment as their first (or only) answer regarding advantages, the result is 14 % (Roma: 11 %, Centro: 18 %). These findings are something I would like to explore further in the next section of the analysis, linked to the relation between intentioned and actual use.

5.2.3 Aspects that call for improvements

The answers to the question regarding aspects that call for improvements was categorized in the following way (if there were several answers, I have chosen the category that fits the first listed answer):

- **Maintenance: 34 %.** Roma: 35 %, F: 23 %, M: 39 %. Centro: 34 %, F: 46 %, M: 29 %.
- **Quality/design: 23 %.** Roma: 28 %, F: 54 %, M: 18 %. Centro: 18 %, F: 23 %, M: 16 %.
- **Coverage: 16 %.** Roma: 13 %, F: 8 %, M: 15 %. Centro: 18 %, F: 15 %, M: 19 %.
- **Availability: 12 %.** Roma: 4 %, F: -, M: 6 %. Centro: 20 %, F: 15 %, M: 23 %.
- **Infrastructure: 4 %.** Roma: 4 %, F: -, M: 6 %. Centro: 5 %, F: -, M: 6 %.
- **Customer service: 4 %.** Roma: 7 %, F: 8 %, M: 6 %. Centro: 2 %, F: -, M: 3 %.
- **Blank: 3 %.** Roma: 7 %, F: 8 %, M: 6 %. Centro: -.
- **Safety: 2 %.** Roma: 2 %, F: -, M: 3 %. Centro: 2 %, F: -, M: 3 %.

For this question, it turned out that the answers covered a wide range of aspects related to Ecobici, its operation and context, and I therefore found it expedient to establish more categories than for the former questions, to be able to examine these nuances. Firstly, I would like to clarify the following categories: Coverage refers to comments about amplifying the system and implementation in new parts of the city and maintenance comprises comments about the state of the bikes. Infrastructure relates to the general facilitation for biking in Mexico City, availability concerns the access to bikes in terms of sufficiency and rebalancing according to

demand. Quality and design comprise the operation of the system, as well as the bike's equipment.

As the number of categories show, the informants have highlighted a range of different aspects of Ecobici that they consider in need of improvement. That said, more than half of the informants states maintenance (34%) or quality/design (23 %) as the most necessary aspects to improve, followed by coverage (16 %) and availability (12 %). For the last four categories, the percentage is between two and four. Informants expressed that they from time to time encountered bikes with flat tires, bad brakes, missing bells or other flaws, which calls for better routines for maintenance. In relation to the quality and design of the system, aspects such as the bike's seat, payment options and the general functionality of the system, emerged. Furthermore, in several of the in-depth interviews the topic of rebalancing came up as an aspect that is not adequately addressed. For instance, one female informant (30) expressed that she had missed appointments due to full or empty docking-stations or technical issues with the system.

I find it particularly interesting that only 4 % of the informants have mentioned infrastructure as the main aspect they would like to improve, considering that this was an aspect that often was brought up in the in-depth interviews with the users. More bike lanes, upgrade of the existent ones, proper traffic signs and better and safer roads were aspects that emerged, as well as the need for extending the coverage. Moreover, even if I extend the group to also include those who have mentioned it among other aspects it only adds up to 7 %. It also caught my interest that two male interviewees highlighted that a possible barrier for potential users is the fear of arriving sweaty at work and that better facilities in terms of showers and changing rooms in the workplaces might encourage non-users to sign up.

5.2.4 Experience of change after starting to use Ecobici

83 % of the informants reported to have experienced personal changes or changes in their daily life after starting to use Ecobici. One of the informants stated: "I feel a positive change in my health, I am more active, have more energy (..) I am a bit more awake, I arrive faster, I feel more in charge, free and in control of my time" (male 26, Roma). The percentage that reported no change is practically the same in both neighbourhoods (~17 %), but an interesting difference is that in Roma the majority of informants who report no change are men, whilst these numbers are inverted in Centro. In Roma, 8 % of the female informants and 21 % of the male informants

reports that they have not experienced any change. In Centro 31 % of the female and 10 % of the male informants report the same.

The informants who reported that they had experienced change in their daily life after starting to use Ecobici (n = 75), were asked to state what changes they had experienced. The answers to this question was categorized in the following way (if there were several answers, I have chosen the category that fits the first listed answer):

- **Physical: 39 %.** Roma: 45 %, F: 42 %, M: 46 %. Centro: 32 %, F: 22 %, M: 36 %.
- **Practical: 29 %.** Roma: 32 %, F: 25 %, M: 35 %. Centro: 27 %, F: 44 %, M: 21 %.
- **Mental: 24 %.** Roma: 16 %, F: 25 %, M: 12 %. Centro: 32 %, F: 33 %, M: 32 %.
- **Other: 5 %.** Roma: 5 %, F: 8 %, M: 4 %. Centro: 5 %, F: -, M: 7 %.
- **Environmental: 1 %.** Roma: 3 %, F: -, M: 4 %. Centro: -.
- **Economical: 1 %.** Roma: -. Centro: 3 %, F: -, M: 4 %.

The category of physical change comprises answers like exercise, physical activity, good shape, better physical condition, stay active, health, weight loss and more energy. The practical category includes answers like saving time, loosing less time in traffic, optimizing transfer time, getting to know the city better, more spare-time, easier mobility and arriving on time. When it comes to the mental category answers includes less stress, more relaxed, happier, move in the city with more tranquillity, better life-quality and less worried.

In the in-depth interviews, several informants emphasized that they began to perceive the city and their surroundings differently after starting to use Ecobici and that riding a bike represents freedom, autonomy and relaxation. One informant added that it was not only his perception of the city that had changed, but also consciousness related to the importance of green spaces and cultural input.

5.2.5 Non-user perspectives

It (Ecobici) could be considered positive in the sense that it's an attempt to change, it's an effort, and initiative..or you could view it as something desperate, premature, just to look good as an avant-garde city.

(Male 30, non-user)

Although the main focus of my research project has been to explore the perspectives of the Ecobici users, I also, as described in the methodology chapter, conducted two group interviews

with non-users. The main aim of speaking to these informants was to broaden the horizon concerning the barriers and constraints that prevents people from using the system and to explore what they consider necessary changes to encourage new users to sign up.

In general, the non-users expressed that they had a good impression of the system. One said he didn't know any users personally, but that Ecobici seem like a good option if security issues are solved - especially in terms of reducing contamination and incentivizing physical activity. Several users pinpointed that the system appears well structured, but that it seems to be aimed at a certain sector of society reflected through the coverage of the scheme amongst other things. Only one informant was directly negative, stating that he did not have a good impression of Ecobici. He perceived the registration process as inadequate, partly due to a failed attempt to sign-up, and furthermore considered the city unprepared for bikes.

Concerning the aspects that prevented the informants from using the system, security issues, lack of infrastructure, accessibility and vial culture emerged as prominent barriers. Lack of respect for cyclists among drivers and pedestrians, few bike lanes, poor vial education among all actors (including cyclists) and not having Ecobici access in their neighbourhood, were outlined as constraints. The female informants also highlighted fear as an issue, both in terms of road safety and in relation to riding a bike and navigating in unknown places. One female informant stated that she did not have Ecobici access in her neighbourhood but wanted to use the system to save money and exercise. She explained that there where Ecobicis outside her office, and thus she had considered signing up to use them for parts of her homebound journey but had refrained from doing so to avoid exposing herself at night-time. The need for having a credit card to register was also mentioned as a barrier for people who does not have a bank account.

When I asked the informants to outline the aspects that would need to change in order to make them reconsider using Ecobici, the answers where closely tied to the barriers outlined above. Improving infrastructure by implementing assigned spaces for bikes in all roads and ensure that people respect them, enhancing vial education among all road users and expanding the coverage were measures highlighted. One of the female informants stated that nothing would change her opinion, as she had been involved in accidents riding her private bike, and another expressed the need for gaining confidence through practicing for instance on weekends. Interestingly, the aspects related to respect and lack of traffic culture were highlighted by the users in the in-depth interviews as points of tension between them and other road users.

5.2.6 Summary

This section has shown that the most prominent advantage with Ecobici is related to convenience aspects, e.g. that it is practical, and the users save time. When it comes to aspects that the informants want to improve, maintenance of the bikes and the quality and design of the system emerge as the most listed aspects. 83 % reports to have experienced personal and/or societal change after starting to use Ecobici, and the most stated changes are of physical and practical character. Non-users highlight that security issues, lack of infrastructure and vial culture as well as the limited coverage of the scheme prevents them from using the system, and that these issues needs to be addressed for them to reconsider using Ecobici.

I consider it crucial to do more research on non-users, as their perspectives are valuable for gaining understanding of the barriers that prevent people from using the system, and as such outline the challenges Ecobici needs to address in order to recruit new users.

5.3 Intentioned and actual use

In this section, I will outline the main aims of Ecobici and explore how the scheme is used. Aspects such as the reason for installing Ecobici, usage patterns and combination with and substitution of other means of transport will be outlined. Through analyzing and discussing results from the survey, observations and interviews with stakeholders and users, I seek to answer *RQIII*: “*What is the relation between intended and actual use?*”

The usage pattern I observed, indicates that most Ecobici-users have signed up for the one-year membership, given that practically all the users I saw used their membership card to pick up a bike. Only in one occasion did I observe two tourists that wanted to register for a 3-days’ use of the system. They clearly had some trouble with the sign-up process and eventually turned to me for assistance, seemingly because they thought I had a formal relation to Ecobici, as I was standing by the docking station conducting surveys. Through field conversations and interviews with users, I identified people who uses Ecobici as a single mean of transport for shorter distances (2-6 km), people who uses it as a single mean of transport for longer distances (7-10 km) and people who uses Ecobici in combination with other means of transport, both of public and private character.

5.3.1 Ecobici: Aims, operation and administration

According to the Ecobici representatives interviewed, Ecobici started in 2010 with the aim of enhancing mobility options and make a more equitable city through promoting and facilitating cycling as an accessible mean of transport. Ecobici has three main objectives: promote mixed-mode commuting, make cycling accessible to the inhabitants and reduce greenhouse gas emissions from urban transport. The scheme seeks to encourage both single trips on bike for those who make journeys of less than 8 km, as well as to offer an efficient option for the first and/or last mile for commuters that moves between the city centre and the metropolitan zone and hence combines several means of transport.

The interviewees stressed that the inspiration to develop Ecobici came from other cities with similar solutions. Furthermore, it resonated well with an overarching goal of making the urban transport more efficient and the city more habitable, equitable and enjoyable. To adapt it to the local conditions the strategy “Estrategia de movilidad en bicicleta de la Ciudad de Mexico” was developed. Today there are 250 000 registered users, making an average of 35 000 trips per day.

The choice of implementation area was based on a study called “Origen-Destino” (Origin-destiny) from 2007, which analysed travel patterns in the Mexico Valley. The 85 initial docking stations sought to serve the area that attracts and originates most travels, as well as to be strategically positioned in relation to massive means of transport such as the metro and metrobus, and was consequently installed in the neighbourhoods of Condesa, Hipodromo, Roma Norte, Juarez and Cuauhtémoc. Towards the end of 2011 a limited area of Centro was also included, making the total coverage 4 km². 40 % of the trips in the city are originated or ends in this area, given that it caters for commercial activity, universities, museums and so forth. In 2012 phase 2 and 3, which comprises Roma Sur, Centro-Buenavista, the borough of Miguel Hidalgo, Polanco, Anzures, Bosque de Chapultepec, San Miguel Chapultepec and Escandon, where implemented. The last big expansion, phase 4, took place in 2015 and covered the borough of Benito Juarez from Viaducto until Rio Churubusco.

In February 2018 a smaller expansion was implemented in the north-western part of the city and Lomas, increasing the total coverage to 38 km². Additionally, 28 electric docking stations were installed and these are scattered in the whole Ecobici coverage area, with the aim of promoting medium and long-distance trips and facilitating bicycle use among elderly people and in steeper parts of the city. They are therefore placed within a 2 to 3 km distance from each other, while the rest of the docking stations are placed within 300 m from each other, to ensure

that people can easily walk to another station in case of encountering an empty or full docking station.

Ecobici is administrated by the Department of Culture and Cycling Infrastructure, a subdivision of SEDEMA, and are in charge of everything related to cycling in the city. The department is divided in three main areas: “Infrastructure and cycling equipment”, which is the area that takes care of bicycle lanes and parking, both short-term urban parking and massive and semi-massive parking in the outskirts of the city. When the research was undertaken, there were two massive parking spaces located in Pantitlan and La Raza with 400 spots each and one semi-massive in La Villa with the possibility of parking 80 bikes. The placement of bike-parking in connection to massive means of public transport and Ecobici, was highlighted by SEMOVI representatives as a good example of their aim of enhancing intermodal travels.

Currently, Mexico City has 186 km of bicycle lanes, and of these only around 10 % are administrated by SEDEMA in the virtue of being primary roads. The secondary roads are administrated by the boroughs, which consequently has the responsibility for bicycle lanes located on such roads. In the development of projects Ecobici collaborates with SEMOVI (the Ministry of Mobility), given that they possess the authority to approve interventions in the vial infrastructure. The role of the bike is now contemplated in the city’s development plans and the mobility planning.

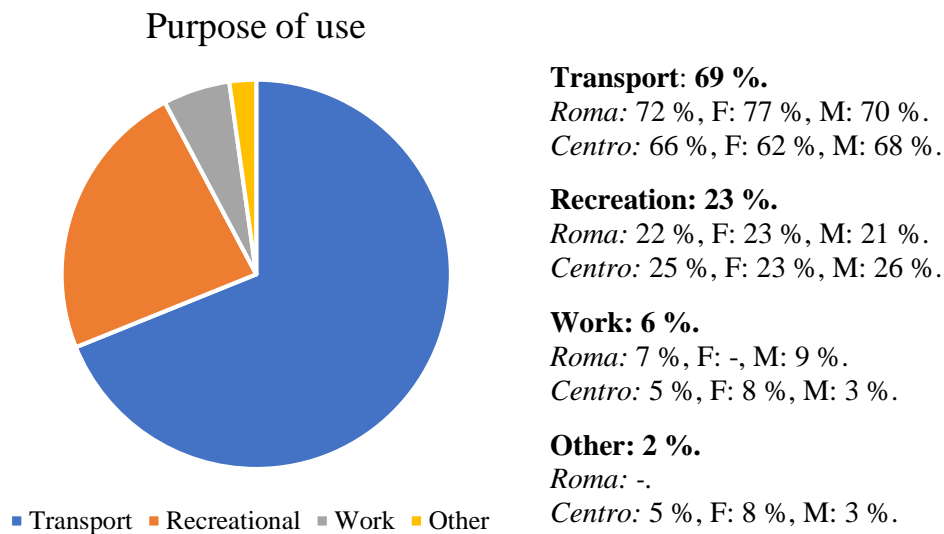
The second department called “Culture and bicycle use”, is in charge of promoting the bicycle as a mean of transport. One of their initiatives includes bicycle schools, where they offer two main types of courses: One for teaching children and people in general to ride a bike and another for learning to use the bike as a mean of transport, focusing on the traffic regulations and to operate the bike like a vehicle. They are also in charge of an awareness course for operators of public transport, as well as “Muevete en bici” (“Move in your bike”), which consist in closing the streets for cars three Sundays a month, inviting pedestrians, cyclist and everyone else interested in recovering their right to the public space. This initiative was the first publicly initiated contact between the citizens and urban cycling and started in 2007 with 10 km of roads, today it comprises 55 km. According to Ecobici representatives, Many people started to use Ecobici on weekends and eventually began to use it for commuting purposes during the weekdays when they realized it was a feasible option that allows to travel larger distances in short time.

The third area is “Ecobici” which takes care of planning and supervision of the operation and maintenance of the scheme. The external operator Clear Channel is responsible for the daily operation and maintenance, which includes the rebalancing of the system in accordance with the usage pattern. Although the scheme is closed for the public from 00.30 to 05.00, Ecobici works 24-hours a day in order to ensure that the bikes are expediently distributed in the morning, as well as for maintenance purposes. The operational hours of Ecobici exceeds the metro’s working hours with half an hour to enable users to make the last mile of their trip in Ecobici. The scheme currently offers 45 minutes of free travel, an extension of the 30 minutes that was offered initially. The new timeframe was established due to the citizen’s (mis)conception of distances in the city, stemming from their experiences with slow traffic, which resulted in scepticism to the reach they would have with only 30 minutes. However, studies show that most Ecobici trips last for less than 30 minutes (López, 2012, 2015).

Ecobici is incorporated in the city card, which can be used for several means of transport. That said, the integration is merely technical which means that if you have signed-up for Ecobici you still need to recharge the card with money (you pay per trip), to use other means of transport. Ecobici administrates social media channels, which works as a customer support for responding questions and receiving feedback.

At the time of my fieldwork there were not any specific plans for further expansion, given that they were closing the current administrative period and because they want the latest expansions to consolidate before evaluating where further growth is required. That said, a former Ecobici representative outlined that there exist conceptual plans and cost estimates for expansion up to phase 10, including the entire area of Coyocan until Miguel Angel de Quevedo in the south further on to the UNAM in the southwest, Tlalpan in the east and Rio de San Joaquin in the north, but that in order for this to happen it needs to be included in public policy and secure an assigned budget from all involved entities.

5.3.2 Purpose of use

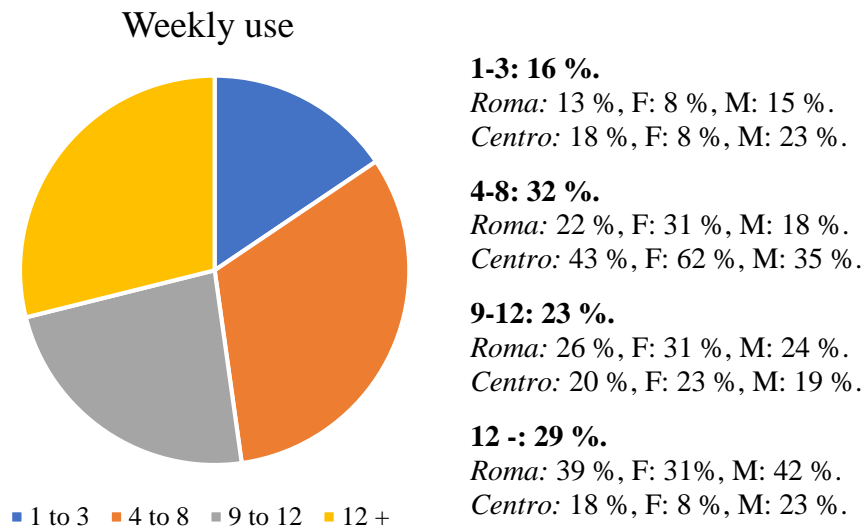


The category of transport comprises the informants who only stated transport as their purpose of use, while answers that included other purposes has been placed in the categories of recreation, work or other.

The numbers clearly indicate that transport is the most common purpose for using Ecobici among the informants in the data set, with approximately 7 out of 10 informants. If I also take into account those that have mentioned transport among other purposes, the percentage increases to 89 %. Nearly 1 out of 4 informants have mentioned recreation as a purpose of use, 6 % has stated work and 2 % fell into the category “other”. As outlined in the table the percentages are quite evenly distributed across the neighbourhoods and between the sexes.

These numbers suggest that there is certain concordance between the purpose of Ecobici as an alternative form of transport and its actual use. The great majority states that the system works as a mean of transport for them and although some of the informants have reported that they use it for recreational purposes, this seems to come second. That said, I want to make a reservation in terms of the generalizability of the findings given that I didn’t gather data during the weekends.

5.3.3 Use frequency



As the numbers show, most of the informants uses Ecobici with high frequency. Approximately half of the informants makes 9 trips or more per week, while around one third states a weekly use between 4 and 8 trips. Only 16 % of the informants reports an average use between 1 and 3 trips per week. This indicates that the users of the scheme are mostly regulars, and hence that Ecobici constitutes an important mean of transport for the users.

That said, there are some interesting differences between the two neighbourhoods. In Roma as much as 65 % of the informants make 9 or more trips per week and almost 4 out of 10 say they make 12 or more trips per week. Another interesting aspect is that the female informants in Roma are equally distributed between the categories 4-8, 9-12 and 12+. In Centro most informants, 43 %, report that they make between 4 and 8 trips per week, with the percentage among women being as high as 62 %. For the other categories the distribution is between 18-20 % of the informants, but I would like to highlight that in the categories with less and most trips (1-3 and 12+), the percentage is higher among male informants.

Regarding the general differences between the neighbourhoods, my first thought is that this most likely is linked to the properties of the neighbourhoods. Roma is, as already mentioned, a so-called “Zona Ecobici”. The area is comprised by smaller streets without a lot of heavy transit, which makes it more apt for cycling - even without a lot of cycling infrastructure. The area of Centro is characterized by more heavy transit and even though it has bicycle-lanes in some parts, both the type provided by the city and the borough, this is rather limited. In addition, the

side streets are really crowded by cars, vendors and pedestrians and thus not facilitated for biking.

5.3.4 Combination with other means of transport

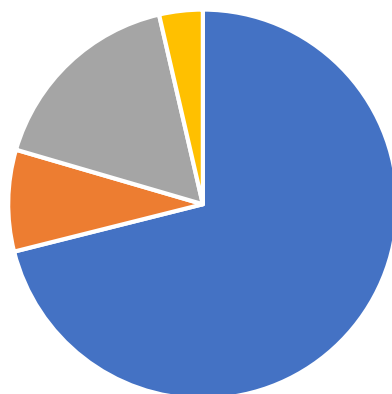
92 % of the informant states that they use Ecobici in combination with other means of transport. It is worth noting that in Centro, none of the informants use Ecobici alone, while in Roma 15 % of the informants does so. Gender wise, 8 % of the female informants say they use Ecobici as the only means of transport, whilst 18 % of the men states the same.

It is plausible to think that this difference between Roma and Centro is related to the infrastructure and profiles of the neighbourhoods. Roma is a so-called “Ecobici area” and consist mostly of “vias secundarias”, i.e. smaller roads that are more apt for biking even if there is not any bike lanes or other designated area for cycling available.

Amongst the informants who stated that they use Ecobici in combination with another mean of transport (n = 83), the categorization of the answers was the following:

- **Public transport (blue):** Metro, metrobus, bus, ecobus, microbuses, trolebus, combi, suburban train, light rail, walking, econduce, private bike
- **Non-public transport (orange):** Car, uber, taxi, motorbike
- **Mix (grey):** Mixed means (mix between blue and orange category)
- **Other (yellow):** Other

Combination with other means of transport



■ Public transport ■ Non-public transport ■ Mix ■ Other

Public transport: 71 %.
Roma: 69 % , F:67 % ,M:70% .
Centro:73 % ,F:77 % ,M:71% .

Non-public transport: 8 %.
Roma: 10 % , F: 8 % , M: 11 % .
Centro: 7 % , F: - , M: 10 % .

Mix: 17 %.
Roma: 18 % , F:17% , M:19% .
Centro: 16 % ,F:15% , M:16% .

Other: 4 %.
Roma: 3 % , F: 8 % , M: - .
Centro: 5 % , F: 8% , M: 3 % .

7 out of 10 informants report that they use Ecobici in combination with public transport or environmentally friendly means of transport. This category includes metro, metrobus, bus, electric scooter, suburban train, informal buses and walking, where metro and metrobus emerges as the most frequently reported means.

17 % of the informants have listed a mix of the means of transport, while only 8 % state that they use Ecobici in combination with non-public transport. Worth noting is that none of the female informants in Centro reports to use Ecobici in combination with these means of transport, while there is not any significant difference between neither the neighbourhoods nor sexes in any of the other categories.

The elevated number of informants that report to use Ecobici in combination with another mean of transport, indicates that the aim of the scheme related to encouraging mixed-mode commuting seem to be fulfilled, but again this might be linked to the sampling days. Furthermore, it cannot be ruled out that some informants have misinterpreted the wording of the questions, which was aimed to identify if people combine Ecobici with other means of transport within a journey, and not if they in general use different means of transport.

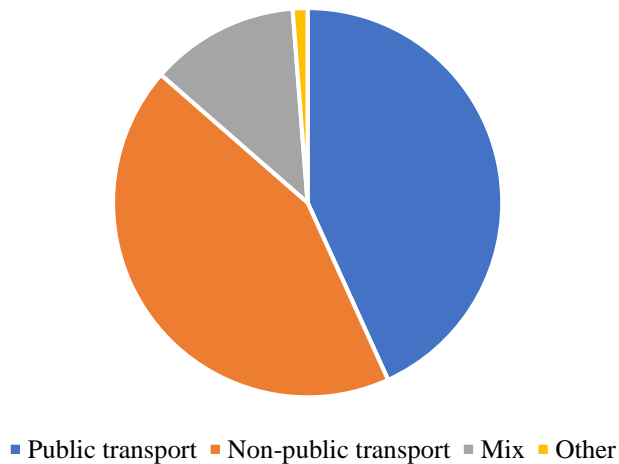
5.3.5 Substitution of other means of transport

9 out of 10 informants states that Ecobici substitutes another mean of transport. In Roma 11 % reports that Ecobici do not substitute another mean of transport, the percentage among female informants being 8 % and male 12 %. In Centro the general number is 9 %, with 15 % among females and 6 % between male informants.

Amongst the informants who stated that Ecobici substitutes another mean of transport (n =81) the categorization of the answers was the following:

- **Public transport (blue):** Metro, metrobus, bus, ecobus, minibuses, trolleybus, combi, suburban train, light rail, walking, e-conduct, private bike
- **Non-public transport (orange):** Car, uber, taxi, motorbike
- **Mix (grey):** Mixed means (mix between blue and orange category)
- **Other (yellow):** Other

Substitution of means of transport



Public transport: 43 %.

Roma: 39 %, F: 33 %, M: 41 %.

Centro: 48 %, F: 55 %, M: 45 %.

Non-public transport: 43 %.

Roma: 46 %, F: 58 %, M: 41 %.

Centro: 40 %, F: 36 %, M: 41 %.

Mix: 12 %.

Roma: 15 %, F: 8 %, M: 17 %.

Centro: 10 %, F: 9 %, M: 10 %.

Other: 1 % - one male informant in Centro states “all the means I use” without specifying which.

As the diagram show, there is an equal distribution between the blue and the orange category, meaning that the number of informants that reported to substitute public transport equals the number for non-public means of transport. I consider this finding particularly interesting, given that it suggests that Ecobici contributes to get cars off the road, whether it is reduction of trips with private cars or with uber or taxi. This represents a significant rise in the share; 13 %* in 2012 and 24 %** in 2014 (López, 2012, 2015). In Roma the percentage who reported substituting non-public means of transport is slightly higher than in Centro (46 % vs 40 %). In the blue category the numbers are inverted, as 48 % of the informants in Centro stated that Ecobici substitutes public transport, whilst 39 % states the same in Roma. 12 % reported that Ecobici substitutes mixed means of transport (yellow), with a slightly higher number reported in Roma.

* *Car and taxi combined* ** *Car (alone), taxi, car (accompanied) and motorbike combined*

Interestingly, only two informants in my survey reported that Ecobici substituted walking. I would have expected this number to be much higher, given that it seems like a logical step to go from walking to biking. Furthermore, the Ecobici reports outline that in 2012 43 % of the informants stated that they would have walked if Ecobici wasn't available, the number being 28 % in 2014 (López, 2012, 2015). The reason this number is so low might therefore be that the informants didn't associate walking with the term “mean of transport”, and hence didn't report it, or that walking for transportation purposes is not that common in the areas where I performed my field work. A third option is that the expansion and growth of the scheme has increased its reach in a way that has enabled substitution of a wider range of transport alternatives, and at the same time made people willing to do so.

5.3.6 Summary

This section has shown that Ecobici's main purposes is to promote mixed-mode commuting, make cycling accessible for the inhabitants and reduce greenhouse gas emissions from urban transport. Furthermore, it attempts to improve urban mobility options and equity in the city. The coverage area responds to the areas of the city which originates and attracts most trips and the docking stations are strategically located in close proximity to other means of public transport. Most informants are frequent users who utilize Ecobici for transportation purposes, in combination with other means of public transport. Furthermore, results from the survey indicates that Ecobici contributes to reduce car use.

6. Discussion and conclusion

The aim of this chapter is to summarize the research project and to approach the main research question: **In what ways Ecobici contribute to a more sustainable urban development?** I will start by giving a brief summary of the content of this study. Secondly, I will try to answer the three sub research questions by outlining my empirical findings and discussing them in relation to existent research and the theoretical framework outlined in chapter 2. Based on the answers to RQI-III and the theoretical framework I will attempt to answer the overall research question, which has been the driving force behind this research project and explore if my findings can contribute to inform existent research. Finally, I will outline some proposals for both further research and measures that might contribute to enhance Ecobici's contributions to sustainable development and its impact on mobility in Mexico City.

6.1 Summary

In this research project I have sought to explore in what ways Ecobici, a shared public bike-sharing scheme in Mexico City, contributes to sustainable urban development in the city. Through conducting and analysing a survey performed in two selected neighbourhoods with Ecobici coverage, field observations and conversations, and undertaking in-depth interviews with users, non-users and stakeholders, I have sought to identify what characterizes the users and their principal motivations for using the scheme. Furthermore, I have attempted to explore the system's attractiveness; how do users perceive the system's functionality? What do they consider as its main advantages? Which aspects would they like to improve and what is the main barriers and opportunities for recruiting new users? Finally, I have tried to examine the main purposes of the scheme and the current user patterns in relation to function, frequency and combination with and substitution of other means of transport.

6.2 RQI: Who are the users and what are their main motivations for using Ecobici?

As the analysis chapter has shown, my research suggests that the average Ecobici user is a younger, male employee with higher education. This profile corresponds with the findings from studies performed on other bike-sharing schemes (see for example Ogilvie and Goodman 2012, Ricci 2015) as well as findings from research based on data gathered 2,5 year after Ecobici initiated its' operation (López, 2013).

72 % of the informants in this study are men, 87 % have at least a bachelor's degree and 76 % has work as main occupation. Half of the informants are aged between 18 and 30 and if I broaden the age span to include the users between 31 and 45, it comprises more than 8 out of 10 informants. Although the skewed gender distribution in my research is slightly more prominent than the distribution presented in the Ecobici survey from 2012 where men constituted 63 % of the users (López, 2012), the result resonates well with studies from London and Dublin. In London almost 70 % of the BCH users are male (Ogilvie and Goodman, 2012), while this is the case for as much as 78 % of the Dublinbike users (Murphy and Usher, 2012). Hence, advocating that the male dominance amongst Ecobici users is due to cultural and social structures specific for Mexico alone, would be a fallacy. According to previous research (Dickinson et al, referred to in Murphy and Usher, 2012) the uneven gender distribution among cyclists might be linked to women's likeliness of undertaking trips with multiple purposes. That said, I consider necessary to perform further research that addresses the gender imbalance in bike-sharing specifically, in order to outline what causes these differences.

It is equally probable for the users to own both a car and a bike as to own neither. However, there were significant differences between the neighbourhoods as 4 out of 10 informants in Roma reported to own none, and in Centro this was the case for 2 out of 10. On the other hand, 36 % of the informants in Centro stated to own only a bike while 17 % in Roma stated the same. As already mentioned, I suggest that these differences are related to the social-economical differences between the neighbourhoods and hence it would be interesting to explore how the findings relates to the car and bike ownership in the general population.

The most common way of getting to know about Ecobici is by 'seeing them on the street', with almost half of the informants, followed by 'through family and friends' and the main motivation for signing up are related to convenience aspects with almost 6 out of 10 informants. The latter is in line with findings from research undertaken across a range of bike schemes (see for example Ricci, 2015 and Fishman et al. 2014a). The second most stated motivation for using Ecobici is related to economic aspects, followed by environmental aspects.

When it comes to the economic aspect, there is a significant difference between the neighbourhoods. 2 out of 10 informants in Centro stated economic reasons as their main motivation for using Ecobici as opposed to 1 out 10 in Roma, a difference that most likely are related to the neighbourhoods differing socio-economic status. Findings from previous research on Ecobici indicates that economic aspects were a motivation for signing up only among 9 % of the users (López, 2013). This might suggest that Ecobici's expansion, although it doesn't

include the least privileged areas of the city, might have encouraged users living in less privileged areas to start to use the scheme, in line with what happened in London after implementing the BCH scheme in poorer parts of the city (Goodman and Chesire, 2014).

6.3 RQII: How attractive is the scheme for the city's inhabitants and what are the most prominent constraints and opportunities?

Prior to the implementation of Ecobici and in conjunction with its expansion and installation of complementary cycling infrastructure, the scheme faced different kinds of resistance from residents, merchants and politicians. The common factor was that they were related to disputes over public space and the perception of the car as a symbol of success. These experiences resonate with Urry's (2004) arguments concerning the path-dependency caused by the system of automobility, which makes the transition to other mobility regimes tough.

Ecobici is generally perceived as an attractive transport alternative among both users and non-users. The most prominent advantages highlighted by the users are the aspects related to convenience (42 %), which suggests a strong correlation between the users' main motivation for signing up and their experienced benefits. Convenience in this context, comprises aspects such as reduction in time spent on transportation, practical features and user-friendliness. Furthermore, 1 out of 4 states environmental aspects as an advantage with Ecobici.

Furthermore, over 80 % of the users reported to have experienced changes after starting to use Ecobici, and these findings harmonise with previous studies of Ecobici (López, 2013). Of these, approximately 4 out of 10 states that physical changes are the most prominent, followed by practical and mental.

When it comes to users' perspectives regarding aspects that should be improved, aspects related to maintenance and quality/design emerges as the most prominent factors, with 57 % of the informants, followed by coverage and availability. Only 4 % stated infrastructure as the most important aspect to improve. According to ITDP (2014, p. 12) comfortable bicycles with a distinctive design, as well as several other factors related to the design and operation of the scheme, are identified as common features among successful bikes-sharing schemes. Hence, I find it interesting that aspects related to the quality and design of Ecobici were the second most listed factor in terms of desired improvements, given that Ecobici are classified as a scheme with high overall performance (ITDP, 2014, p. 40).

Among non-users, safety issues, coverage and vial culture were stated as the most prominent barriers for using the system. Non-users stressed that addressing these issues through improving cycling infrastructure, enhancing vial education and expanding Ecobici's coverage, are necessary to make them reconsider using the scheme. Additionally, fear was highlighted as an important constraint among the female non-users.

According to Ricci (2015), access to docking-stations in close proximity to home are thought to increase the probability of bike-sharing use, and this corresponds with my findings. Although not identified by the survey, all the interviewed users reported to live in an area with Ecobici coverage. Furthermore, several of the non-users said that that they did not have access to the scheme in their neighbourhood, which discouraged them from undertaking a modal shift.

These findings suggest that safety concerns related to lack of adequate infrastructure, in line with Fishman et al.'s (2012) allegations, is a considerable barrier for recruiting new users to Ecobici, but that lack of cycling infrastructure doesn't seem to influence Ecobici's attractiveness nor performance significantly. De Chardon et. al. (2017) found that cycling infrastructure had variable impact rates on scheme's performance and generally a lower impact than expected, which might indicate that the linkage between infrastructure and performance is influenced by local conditions. Furthermore, concerns related to personal safety seem to be an important barrier for recruiting female users and hence this is an issue that should be explored further in relation to the lower share of female users. Both to enhance the understanding of the aspects that causes the prominent lower share of female users, be it in the case of Ecobici or in bike-sharing schemes in general, and to be able to address the barriers for recruiting new users in an efficient manner.

6.4 RQIII: What is the relation between intentioned and actual use?

The introduction of Ecobici was inspired by other, similar schemes and was implemented in the areas of the city that originates and attracts most trips and in connection to other means of transport. This is the same strategy as seen for instance in the case of New York's City Bike (Ricci, 2015). In line with Mateo-Babiano's (2015) recommendations, an extensive mobility strategy was elaborated to ensure a system adopted to the local needs and conditions.

My study identified promoting mixed-mode commuting, making cycling accessible to the inhabitants and reducing greenhouse gas emission from urban transport, as Ecobici's main aims. Furthermore, Ecobici representatives emphasised that promoting and facilitating cycling as a

transport alternative, both independently and in combination with other means of transport, responds to overall goals of making urban transport more efficient and the city more habitable, equitable and enjoyable.

The scheme is incorporated in the city card for transport and its operating hours exceeds the metro with 30 minutes, to enable users to undertake the “last mile” of their journey with Ecobici. The docking-stations are placed within 300 meters from each other to facilitate the access to the scheme in case of encountering an empty or full docking-station, which is identified as a common feature among successful schemes (ITDP, 2014, p. 12).

My research reveals that the main purpose for using Ecobici is transport. The frequency of use is high, considering that more than half of the informants make 9 trips or more per week and less than 20 % reported to make 1 to 3 trips a week. Furthermore, 9 out of 10 informants stated that they use Ecobici in combination with other, mainly public means of transport and the same amount reported that Ecobici substitutes other means of transport.

In terms of substitution of other means of transport, the distribution between public and non-public means is equal, which indicates that Ecobici actively contributes to remove cars from the streets. Previous research show that in 2012, 13 % reported that Ecobici substituted car use (López, 2012), while the number had increased to 24 % in 2014 (López, 2015). This development suggests that the expansion of the scheme’s coverage, and the increase in the number of users, has affected the share of car substitution positively.

Interestingly, my findings differ from results obtained for instance in studies of bike-sharing schemes in Brisbane, Melbourne, Washington D.C., Minneapolis and London which shows that car substitution were modest, and that bike-sharing mainly were substituting public transport and walking (Fishman et al., 2014b). Furthermore, very few informants in my study reported that Ecobici substituted walking, which in comparison were found to be the most substituted mean of transport among the users of Dublibike, with a share of 45 % (Murphy and Usher, 2012).

Based on the findings outlined above, it seems that there is certain correlation between the intentioned and actual use of Ecobici. Most informants report that they use Ecobici for transportation purposes, in line with the aim of introducing the scheme as an alternative mean of transport. The great majority of the informants state that they use Ecobici in combination with other means of transport and hence it could be argued that the objective of enhancing

mixed-mode commuting is fulfilled. Furthermore, my research suggest that Ecobici contributes to reduce greenhouse gas emission from urban transport through reducing car trips.

When it comes the third main objective of Ecobici, making cycling accessible to the inhabitants, I will argue that this aim is not fully accomplished considering the predominance of men with higher education among the users, which indicates that the scheme is accessed by a certain segment of society. According to Ricci (2015), one of the factors influencing the user profile are the geographical coverage of the scheme. Although this to a certain extent might explain the elevated percentage of users with higher education, given Ecobici's centralized placement strategy corresponding to areas with medium to high socio-economic status, further research is as already mentioned needed in order to address for instance the skewed gender distribution.

To what extent Ecobici's has contributed to the more general goals of making urban transport more efficient and the city more habitable, equitable and enjoyable, might be hard to measure given that the targets are vague and due to the lack of adequate tools (Ricci, 2015). That said, I will venture to outline some general thoughts: Given that convenience and hereunder aspects such as reduction of time spent on transport, practicality and efficiency, emerged as the most frequently stated advantages of Ecobici, I will argue that the scheme has contributed to make transport in the city more efficient – at least on an individual level. Furthermore, the significant share of informants that reported to have substituted car trips with Ecobici and the high share of informants that reported having experienced (positive) changes in their lives after starting to use Ecobici, suggest that the scheme has contributed to make the city more habitable and enjoyable, both for users and non-users. Regarding Ecobici's implications for equity, I have already discussed this in relation to user profiles and access, but in the next section I will bring the discussion further in relation to the main research question and Campbell's (1996) approach to sustainability.

6.5 Conclusion: In what ways does Ecobici contribute to a more sustainable urban development?

As outlined in the introduction chapter, urban areas are currently facing numerous challenges related to rapid urbanization and climate change mitigation and adaptation. Although cities to a large extent represent the problem, they are also considered a crucial part of the solution due to advantages generated by economies of scale (Tonkiss, 2013, p. 113). According to the UN (2014) the creation of sustainable cities is key to ensure sustainable development, and hence in this thesis I have approached the challenge of mobility using Ecobici as a case, with the aim of analysing its impact, constraints and potential as a promoter of sustainable urban development.

The empirical evidence presented in this research project suggest that Ecobici has contributed positively to Mexico City's mobility challenges in several ways, but mainly by offering an alternative and green mode of transport and through encouraging mixed-mode commuting. Furthermore, it can be argued that Ecobici has contributed to more efficient transport in Mexico City. Users outline spending less time on transport and easier mobility as important advantages and experienced changes after starting to use Ecobici, which indicate efficiency improvements on an individual scale. Additionally, my study indicates that Ecobici contributes to substitution of car trips, which has a positive effect both for the individual and the society. According to Banister (2008), the abovementioned aspects are part of required changes within a sustainable mobility approach, and as such, I will argue that Ecobici constitutes a relevant measure.

Moreover, Banister (2008) argues that achieving public acceptability is core to successful implementation of radical change and regarded as essential for political change. In this context, I find it particularly interesting that López (2013) suggest that the implementation of Ecobici in areas with an elevated socio-economic status has contributed to change people's perception of the bike as a transport alternative for the poor. Although further research is needed to corroborate this assumption, the identified user profile might suggest a linkage.

Furthermore, the implementation of a new mobility law in Mexico City in 2014 prioritizing pedestrians and cyclists in both legal and financial terms (Gobierno Cdmx, 2018) and the implementation of Ecobici and other alternative modes of transport, indicates a shift in transport policy. According to Urry (2004), such shifts can contribute to tip the current automobile system into a new mobility paradigm. That said, achieving a transformation is dependent on a number of other transformations emerging at the same time, but Ecobici can be considered a small step in the right direction.

Finally, I will review the three corners of Campbell's (2006) triangle for planning; economic growth, environmental protection and social justice, to outline if Ecobici manages to attend the three (conflicting) views and hence can be considered a contributor to sustainable urban development.

As outlined, Ecobici membership has a low cost and offers an unlimited number of trips. As such, it represents an economically sustainable mean of transport for the users. Furthermore, my empirical evidence indicate that Ecobici reduces time spent in traffic, which is positive for the economy given that congestion causes substantial economic losses (OECD, 2015, p. 74). Additionally, bike-sharing schemes have low costs of implementation and operation compared to other mobility alternatives (Shaheen, et al. 2010), and hence I will argue that Ecobici attends the economic aspect of the planner's triangle.

As mentioned, a study shows that Ecobici contributed to an emission reduction of 232 tons of CO₂ equivalents in its first three years of operation, based on a car substitution rate of 13 % (SEDEMA, 2013). My findings indicate an increase in car substitution, and hence I would expect that current emission reductions also would increase. That said, these assumptions might need an adjustment if considering the emissions from rebalancing activities and the growth in the number of cars in Mexico City (INEGI, 2018b). The lack of precise empirical evidence makes it hard to determine Ecobici's exact environmental impact, however, car substitution, encouragement of mixed-mode commuting, and bike's zero emission profile can be considered positive environmental contributions, regardless of measured reduction in air pollution and congestion, and as such the environmental aspect is catered for.

When it comes to Ecobici's attendance to social equity, my study clearly indicates that the scheme attends a certain segment of society, evidenced through a clear dominance of younger, male users with higher education. According to Campbell (1996) it is not possible to reach the center of the triangle, sustainable development, without solving the conflicts it represents and my findings indicate that the aspect of social equity is not safeguarded in Ecobici's current form. As seen, Ricci (2015) advocates that geographic coverage might influence user characteristics and considering Ecobici's implementation strategy, I find this linkage relevant.

Finally, my research revealed that 'seeing them on the street' were stated as the most common way of getting to know about Ecobici and that non-users reported the scheme's coverage as a prominent barrier for using it. Research from London indicates that expanding the coverage to less privileged areas influences the user's profile and that people in less privileged areas can

and will do use bike-sharing if they have access to it (Cheshire and Goodman, 2014). In my opinion, these findings suggest that expansion to less privileged areas is recommendable in order to improve accessibility for a broader range of citizens, both geographically and socio-economically, which in turn might enhance Ecobici's contribution to sustainable development in Mexico City.

6.5.1 Final remarks

Based on the empirical findings analysed and the theoretical framework revised throughout this thesis, I will argue that bike-sharing arguably has a lot of positive effects. That said, it still seems to have unreleased potential when it comes to reaching its full potential for contributing to sustainable urban development. Evidence gathered from a range of schemes indicates that bike-sharing caters for a limited segment of society, and as such fails to attend the social equity aspect of Campbell's trinity of sustainable development. This in turn raises questions regarding bike-sharing's aims and its actual outcomes. How useful is a (green) mobility measure that, intentionally or unintentionally, targets users with certain socio-economic features for achieving sustainable urban development? It is plausible to assume that the exclusion of large population groups also reduces its effects on environmental and economic aspects, and hence the question is; what can be done to ensure a more equal access to bike-sharing? Price mechanisms is one measure that in other contexts has proved to enhance accessibility but given that this is already addressed in most public bike-sharing schemes, I will suggest that the geographical factor, i.e. the coverage of the scheme and its effect on user profiles, should be further explored in order to enhance bike-sharing's potential for contributing to sustainable urban development. That said, establishing the coverage area is to a large extent a political and economic decision, and as such it seems like the development conflict related to social equity and environmental preservation is the one that needs to be targeted.

7. References

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8. Appendix

I: Questionnaire for Ecobici users



Encuesta sobre uso del sistema ECOBICI

El siguiente cuestionario busca recolectar datos para mi tesis de maestría en geografía humana de la Universidad de Bergen, Noruega. El propósito del estudio es entender el impacto que ha tenido la ECOBICI en la CDMX, tanto en cuestiones de movilidad como a nivel personal. Es completamente voluntario contestarlo y toda las respuestas serán anonimizadas ¡Muchas gracias por su tiempo!

Datos sociodemográficos

1) Edad

- 18-30 años ()
- 31-45 años ()
- 46-60 años ()
- 60 + años ()

2) Sexo

- Femenino ()
- Masculino ()
- Otro ()

3) Nivel de estudios

- Primaria ()
- Secundaria ()
- Preparatoria ()
- Licenciatura ()
- Posgrado ()

4) Ocupación principal

- Estudia ()
- Trabaja ()
- Quehaceres de la casa ()
- Jubilado ()
- Otro _____ ()

Sus experiencias con el sistema Ecobici

5) Cuántas veces a la semana usa la Ecobici?

- 1-3 ()
- 4-8 ()
- 9-12 ()
- 12+ ()

6) Por qué decidió inscribirse a Ecobici?

7a) Usa la Ecobici en combinación con algun otro modo de transporte?

- SI ()
- NO ()

7b) En caso de que SI, cuál(es)?

8a) La Ecobici sustituye algun otro modo de transporte?

- SI ()
- NO ()

8b) En caso de que SI, cuál(es)?

9) Qué ventajas tiene la Ecobici?

10) Qué aspectos de la Ecobici podrían mejorar?

11) Para que fines usa la Ecobici?

12a) Ha notado algun cambio en su vida cotidiana o en Usted desde que empezó a usar la Ecobici?

- SI ()
- NO ()

12b) En caso de que SI, cuál(es)?

13) Tiene bicicleta y/o coche propio?

- Bicicleta ()
- Coche ()

14) Cómo se enteró del programa Ecobici?

- Publicidad ()
- Familiares y amigos ()
- Vio las bicis en la calle ()
- Otro _____

Si le interesaría participar en una entrevista más extensa sobre sus motivaciones y experiencias con el sistema Ecobici, por favor proporcione un correo electrónico y/o número de celular para poder contactarlo: _____

II: Interview-guide Ecobici users

- ¿Edad, nivel de estudios, ocupacion principal, usos semanales de Ecobici?
- ¿En que colonia vive/trabaja (estudia)?
- ¿Que medios de transporte usa?
- ¿Para un viaje hace uso de diferentes transportes?
- ¿Que ventajas tienen los diferentes medios de transporte que usa?
- ¿Cuales son las desventajas de los mismos?
- ¿Cuanto tiempo lleva usando Ecobici?
- ¿Motivaciones para inscribirse al sistema?
- Describe los trayectos que hace
- ¿Como se lleva con otros usuarios?
- ¿Como es la relacion con automovilistas?
- Describa mas sobre las ventajas que tiene Ecobici
- ¿Que aspectos se podrian mejorar?
- Describa mas sobre los cambios que ha notado en su vida
- ¿La Ecobici ha influido en su percepcion de la ciudad?
- ¿Que impacto ha tenido la Ecobici en la movilidad de la ciudad?
- ¿Ha sido necesario hacer algun cambio en sus rutinas?
- ¿Hay lugares/situaciones que evita al usar la bici?
- ¿Tiene bici y/o auto propio?

III: Interview-guide none-users

- Edad, nivel de estudios, ocupacion principal, sexo.
- ¿En que colonia vive y en que colonia estudia/trabaja/otro?
- ¿Que metodos de transporte usa?
- ¿Para un viaje hace uso de diferentes transportes?
- ¿Que ventajas tienen los medios de transporte que usa?
- ¿Cuales son las desventajas?
- ¿Conoce el sistema Ecobici?
- ¿Ha considerado inscribirse?
- ¿Que se tendria que mejorar/cambiar para que volviera a considerer inscribirse a Ecobici?
- ¿Cuales son sus impresiones sobre el Sistema Ecobici?
- ¿Tiene bici propia y/o auto?