Utrecht University

# Promoting a Transition to Clean and Inclusive Mobility in the Global South

## A Socio-Technical Analysis of Public Bike Sharing Systems in São Paolo

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## Summary

As a result of recent trends of mega-urbanization, cities in the Global South face severe problems related to urban mobility, including congestion, air pollution, and health. In addition, land use and urban transport policies based on motorized transport contribute significantly to climate change. Scholars have therefore proposed a sustainable mobility paradigm, stressing the need for a transition towards clean and inclusive mobility. One innovation that recently gained importance is public-bike sharing systems. However, it has been unclear what the roles of different actors are in promoting this transition in Global South cities, and what drivers and barriers exist.

Besides being one of the biggest metropolises in the Global South, São Paulo also faces some of the worst mobility conditions. Besides, it recently saw the emergence of three public bike sharing systems. This research therefore takes São Paulo as a case study area, and studies the role of different actors promoting the transition towards clean and inclusive mobility. The data-collection included a five-month field research in São Paulo, where semi-structured interviews have been conducted with public-bike sharing systems companies, cycloactivist organizations, and senior administrative and political decision-makers working at the Municipality of São Paulo.

Findings suggest that civil society organizations play a much bigger role in promoting the transition than previously anticipated upon in the literature. Together with private actors, civil society actors have consolidated cycling policy by forming professional organizations, using depolitization strategies and providing technical assistance to the Municipality. Socio-institutional innovation at the municipal level facilitated a closer collaboration between key actors, allowing the emergence of an epistemic community. It further suggests that public bike sharing companies form an important contribution to pushing the regime to stimulate clean mobility. However, this research finds that problems of inclusivity remain as a result of deregulation of public bike sharing system policy at the municipal level. Last, this thesis identifies drivers and barriers that currently affect the transition and provides recommendations to further accelerate clean and inclusive mobility in the Global South.

**Key words:** Public bike sharing systems, Cycling policy, Multi-Level Perspective, Transition, Developing countries

# Sumário

Como resultado das recentes tendências de urbanização, cidades do hemisfério sul enfrentam severos problemas relacionados a mobilidade urbana: congestionamento, poluição do ar, e saúde. Além disso, as políticas de uso de terra e de transporte urbano baseadas em transporte motorizado contribuem significativamente para a mudança do clima. Portanto, acadêmicos têm proposto um paradigma sustentável de mobilidade, estressando a necessidade de transicionar para uma mobilidade sustentável e inclusiva. Uma inovação que tem sido sugerida para ter um importante papel nessa transição de mobilidade é a de sistema público de bicicletas compartilhadas. Porém, não está sendo claro quais são os papéis dos atores em promover essa transição nas cidades do hemisfério sul, e quais são as impulses e barreiras existentes.

Além de ser uma das maiores metrópoles do hemisfério sul, São Paulo também enfrenta algumas das piores condições de mobilidades. Além disso, recentemente viu o surgimento de três sistemas públicos de compartilhamento de bicicletas. Esta pesquisa, logo, toma São Paulo como área de estudo de caso, e estuda o papel dos diferentes atores na promoção da transição para uma mobilidade mais sustentável e inclusiva. A coleção de dados inclui uma pesquisa de campo de cinco meses em São Paulo, onde entrevistas semiestruturadas foram conduzidas com companhias de compartilhamento de bicicletas, organizações de cicloativistas, e administradores e políticos tomadores de decisão seniores que trabalham na prefeitura de São Paulo.

Resultados sugerem que organizações da sociedade civil têm um papel muito maior em promover essa transição do que foi previamente antecipado pela literatura. Junto de atores privados, os atores da sociedade civil têm consolidado a política do ciclismo formando organizações profissionais, usando de estratégias de despolitização e provendo assistência técnica para a prefeitura. Inovação socioinstitucional facilitou uma colaboração mais de perto entre os atores chaves, permitindo o surgimento de uma comunidade epistêmica. Em seguida, ela sugere que companhias de compartilhamento de bicicletas têm uma importante contribuição em forçar o regime para medidas de mobilidade limpa. No entanto, esta pesquisa descobre que os problemas de inclusão permanecem como resultado da desregulamentação da política pública do sistema de compartilhamento de bicicletas no nível municipal. Por último, as resultados identificam as motivações e barreiras que hoje em dia afetam a transição e provê recomendações para assim acelerar uma mobilidade mais sustentável e inclusiva no hemisfério sul.



**Palavras chaves:** Sistemas de compartilhamento de bicicletas, políticas de ciclismo, Multi-Level Perspective, transição, países em desenvolvimento

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*Cada um de nós é vários, é muitos, é uma prolixidade de si mesmos. Por isso aquele que despreza o ambiente não é o mesmo que dele se alegra ou padece. Na vasta colónia do nosso ser há gente de muitas espécies, pensando e sentindo diferentemente.*

Each of us is several, is many, is a profusion of selves. So that the self who disdains his surroundings is not the same as the self who suffers or takes joy in them. In the vast colony of our being there are many species of people who think and feel in different ways.

*Fernando Pessoa,* Livro Do Desassossego

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# List of Abbreviations

**BTC** – Brazilian Traffic Code

**CSO** – Civil Society Organizations

**DOSE** – Department of Open Space and Environment

**MLP** – Multi-Level Perspective

**PBSS** – Public Bike Sharing Systems

**PPP** – Public-Private Partnership

**SoMT** – Secretary of Mobility and Transport

**SPMR** – São Paulo Metropolitan Region

**TEC** – Traffic Engineering Company

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# 1. Introduction

In recent years low-income and emerging countries in the Global South have developed trends of mega-urbanization (Datta & Shaban, 2016). Modernization and economic development have resulted in steep rises in motorization rates, exacerbating climate change, air pollution, health problems and extreme levels of congestion (UN-Habitat, 2012). One innovation to confront urban mobility problems has recently gained increased scholarly attention due to the widespread deployment in cities across the world: public bike sharing systems (de Maio, 2009; Fishman et al., 2013; Shi et al., 2018). Its many benefits are firmly acknowledged: cycling reduces emissions and congestion, allows individual financial savings, supports intermodal connectivity and democratizes urban space (Fishman et al., 2013). Despite its benefits, most developing countries are still dominated by motorized transport, posing challenges for sustainable, healthy and equitable transportation systems centred around walking, cycling and public transport (Whitmee et al., 2015).

Indeed, in a recent report by the Intergovernmental Panel on Climate Change (IPCC), scientists argue that for global warming to be limited to the agreed 1,5 degrees Celsius, 'unprecedented systems transitions' are required in areas of energy, land, urban and infrastructure (including transport and buildings) (IPCC, 2018). Over the past two decennia, the Multi-Level Perspective has emerged as an important framework to study such socio-technical transitions (Kemp et al, 1998; Geels, 2002). While an increased amount of empirical and explorative research has been conducted in order to understand sustainability transitions, most of this work has been focussed on advanced industrialized countries, leaving a vacuum of understanding on much needed socio-technical transitions in emerging and developing countries (Ramos-Mejía et al, 2018; Markard et al, 2012; Coenen et al., 2012). This has consequentially led to the evasion of many issues of social justice relevant to emerging countries, such as which transition? for whom? and by whom? (Scoones et al., 2015).

Besides being one of the biggest metropolises, São Paulo is facing some of the worst transport conditions of the Global South. The Brazilian city is ranked as the 5$^{th}$ most congested city in the world, contributing to air pollution and climate change (Inrix, 2018). Anticipating on the recent emergence of public bike share systems and the city's renewed attention for cycling, this study analyses the cycling transition in São Paulo.

Studies on sustainable mobility have advocated for in order to achieve a mobility transition, a city requires 'active citizen support and new forms of communication between experts and citizens, through new forums for discussion and the involvement of all major stakeholders' (Banister, 2008: 74). Further, to fund sustainability objectives, increased attention has been drawn

towards the role of private actor participation in public service provision (Pinz et al, 2018). How these private, civil society and state actors interact, and what their roles are in promoting the transition towards clean and inclusive mobility in the Global South has thus far been unclear. This study therefore examines the role of niche actors in transforming the socio-technical mobility regime. It analyses the historical development of the mobility regime, niche actor roles and interactions with the state, and provides an overview of current drivers and barriers of the mobility transition. This results in the following main and subquestions:

What is the role of niche actors in fostering the transition towards inclusive and clean mobility in São Paulo and what are current drivers and barriers?

i . How has motorized transport become dominant in São Paulo's socio-technical mobility regime in the 20th century?

ii. What are the roles of niche actors in promoting the transition towards more bike use and how have their strategies changed over time?

iii. What are the drivers and barriers that foster and hamper the use of public bike sharing systems in São Paulo?

The main aim of this research is to understand how private and civil society actors promote a transition towards inclusive and clean mobility, whilst identifying drivers and barriers. This will be done by analysing the socio-technical regime, using an adapted Multi-Level Perspective framework (Geels, 2002), broadened with literature on urban planning, development studies and political science.

First, a historiography of the socio-technical mobility regime in São Paulo will be provided. It analyses how during the 20th century important lock-in mechanisms were developed, as state actors favoured motorized privatized transport over public transport and non-motorized transport such as walking and cycling. The elicited lock-in mechanisms, such as built infrastructures, shared beliefs and institutional arrangements, will become relevant again in the third section, discussing drivers and barriers analyses to understand how different so-called 'niche actors' promote cycling, by studying their roles, relationships and strategies.

Second, using an adapted Multi-Level Perspective framework, it examines how the private actors and civil society work together at the niche level, and how they have changed their strategies over time in order to promote

public-bike sharing systems in particular and clean and inclusive mobility in general.

The third subquestion forms a synthesis of the first two subquestions. It considers drivers and barriers that currently foster and hamper the transition to more bike use in São Paulo. As will become clear in the results, many of the barriers stem from the development of a car-centred mobility regime, whilst many drivers are emerging from an increasingly influential niche.

## 1.1. Scientific & Social Relevance

This study is embedded in literature on sustainable transport studies, transition management and participatory urban development, contributing to scientific knowledge on how inclusive sustainable transitions in the urban sphere are accelerated. The large majority of transition studies constitute case studies focussed on transitions in advanced industrialized countries in the Global North. By drawing upon development studies and urban planning literature on a Global South case, this case study adds novel empirical and theoretical insights to transition literature.

This study also has relevance for our societies, by producing a better understanding of the social and environmental dimensions of urban mobility. In order to limit global warming to 1,5° Celsius, our society's most important sectors need to be transformed drastically. As the world continues to urbanize, an increasing amount of today and tomorrow's environmental and social problems demand urban solutions. By examining the mobility transition in São Paulo, this study addresses these issues. It aligns with the UN-HABITAT III New Urban Agenda and SDG 11's pursuit to examine, analyse and promote those urban policies that promote justice, sustainability and inclusion in cities. Consequently, the outcomes of this research are not relevant to Brazil only. On the contrary, many metropolises like São Paulo, especially in the Global South are facing similar issues concerning urbanization, high congestion and pollution levels and patterns of social exclusion. It deals with the most urgent questions on how to transform our cities towards being both environmentally friendly, as socially inclusive. The outcomes of this research are therefore pertinent to urban conditions worldwide, especially to urban metropolises in the Global South.

# 2. Theoretical Framework

The theoretical framework is structured as follows. The first section situates the bicycle within the literature on sustainable urban mobility and environmentalism. The next section describes a brief history of public bike sharing systems (PBSS) and discusses different provision models. The third section reviews literature on public-private relationships and the role of civil society. The last section presents the Multi-Level Perspective as an analytical framework, elucidates its most important concepts and introduces necessary theoretical adaptions for the case studied here.

## 2.1. The Bicycle: Concepts & Benefits

The importance of the bicycle in a sustainable urban mobility context has been demonstrated widely in a broad range of literature (Horton, 2006; Furness, 2007; Sadik-Khan & Solomonow, 2016). It is praised as an indispensable part of the sustainable mobility paradigm due to its high accessibility to all classes, low maintenance costs, low infrastructural investment requirements, practically virtually zero carbon impact and health benefits (Banister, 2008; Geels, 2012).

The bicycle is primarily used for two reasons, *leisure* and *transport* (Soares & Guth, 2018). The functional distinction is important, as the functionality has strong implications for public policy and business orientation, often driven by cultural perceptions of the bicycle, as will be elaborated in later sections.

As Rabello (2019) argues, the bicycle does not have the pretention or capacity to resolve the challenge of urban mobility alone. Aside from replacing many short distance trips, the bicycle is also very effective as a complementary mode of transport for the first and last mile, integrated with existent public transport systems.

The benefits of bicycle use are numerous: physical activity provides a good health, reduces pollution and travel accidents, increases social interaction, and democratizes urban space (Andersen et al., 2000; Horton, 2006; Rosa & Schroeder, 2014; Sadik-Khan & Solomonow, 2016).

Social and economic costs are increasing in Brazil as diseases associated with overweight and obese are becoming more prevalent (Rtveladze et al., 2013). Between 2003-2015, the prevalence of obesity doubled in São Paulo, considering all age groups, 21% female and 17% male were obese (Pereira et al., 2018). If this pattern does not change, three quarters of the population of São Paulo will have excess body weight in 2030. Forms of physical activity such as cycling are therefore recommended (idem).

The World Resources Institute (WRI) (2018) estimates that due to the effects of air pollution, São Paulo inhabitants lose on one and a half years of life expectancy (WRI, 2018). De Sá et al., (2017) estimate if Sao Paulo pursues an

active mobility until 2040, 4,7% of premature deaths from heart disease can be avoided due to health benefits, besides substantially lowering traffic deaths.

Currently, 'Roads are built for cars, and this combination stifles vital human behaviour like social interaction, physical activity, and spontaneity' (Sadik-Khan & Solomonow, 2016: 61). The bike does not only provide the opportunity to have better access to basic public services offered by the city (work, education, culture), it also occupies and democratizes the streets, stimulating social interaction between both citizens amongst each other and with the city itself (Rosa & Schroeder, 2014). In *The Life and Death of Great American Cities*, Jane Jacobs (1961) describes how having eyes on the street creates a sense of trust and safety in the neighbourhood. While referring primarily to pedestrians in her book, the same holds true for cyclists due their low velocity and open nature.

### 2.1.1. The Bicycle and Environmentalism

In various societies around the world, social movements have used the bicycle as an important symbol to represent countercultures (Horton, 2006). The bicycle played a role in Europe for feminism in the late 19$^{th}$ century and socialism in the early 20$^{th}$ century, and for post-1960s anarchism in various European and Latin American countries. Most recently, the bicycle has become an important symbol and 'materiality' in pursuing environmentally 'green' visions (idem).

Materialities of future sustainable societies are used to contrast materialities of current unsustainable practices and regimes. Examples are solar panels and wind turbines, as opposed to nuclear reactors and coal power plants. In the current debate on future mobility, the bicycle is put forward as a solution to the world's social and environmental problems in three different ways.

First, as an object of environmental discourse, articulating green visions. During the 1960s and 70s, public debate was centred around the energy crises, with many actors demanding alternatives for energy and transportation. As the critique against the car became stronger, what was needed was:

> 'a vehicle able to negotiate the urban environment without leading to its degradation, suffocation or ceaseless expansion. With cars driving affluent societies towards the environmental apocalypse, bicycles become the route to ecological sanity (Horton, 2006: 43).

Second, in cities with low levels of cycling infrastructure, being on the bike in traffic with limited traffic signals, bike lanes and formal rules, cyclists

infringe on the incumbent sociocultural dynamics of urban traffic. Riding a bike therefore directly results in 'the personal as political' (Horton, 2006: 46).

The third point is articulated by Furness (2007) who describes how social movement *Critical Mass* used the act of cycling as a *performative critique* of motorized space. During their 'organized coincidences' of their part protest, part celebration, the message was clear: 'We are not blocking traffic, we are traffic!'. The movements' actions drew strong controversy and by using spontaneity and playfulness, they helped transform public perceptions about cycling, automobility and the (mis)use of public space (Furness, 2007).

## 2.2. Public Bike Sharing Systems

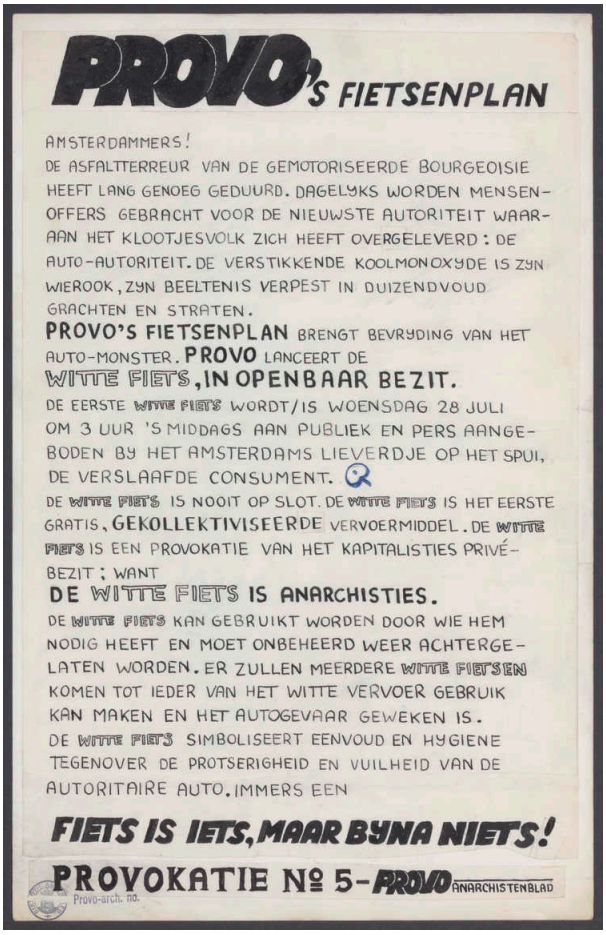
The public bike sharing system (PBSS) also finds its roots in a social movement, but has changed significantly over time in terms of technology and governance. This section provides a brief historical overview of PBSS in the world, discusses its benefits and flaws and its provision models. Public bike sharing systems are defined as 'a locally customised provision of affordable short-term access to bicycles on an as-needed basis that could extend the reach of public transit services to final destinations' (Nikitas et al., 2017).

### 2.2.1. Brief History

In the history of public bike sharing systems, four generations can be distinguished. The first generation of a public bike sharing system was initiated by a counterculture movement in the Netherlands called the Provos. As a protest against the "asphalt terror of the motorised bourgeoisie", and to propose a solution for the "suffocating carbonmonoxide", one of the Provos, Luud Schimmelpenninck, launched publically owned white-painted bicycles on July 28, 1965 in Amsterdam (see Figure 1). The Witte Fietsenplan, or White Bike plan was rooted in anarchist thought: the public bicycle was used as a provocation against capitalist private ownership, and could be used by anyone, as they did not have locks. One could simply take and leave the bike whenever needed.

Nevertheless, the plan did not work. According to DeMaio (2009) many bikes were thrown or fell into the city's many canals or got stolen. Zee (2016), based on primary sources, argues that the police removed many of the bikes soon after the launch in an attempt to counteract the provocative plans of the Provos (Zee, 2016). Two years later, White Bike Plan progenitor Schimmelpenninck was elected as a city counsellor, and proposed to distribute 10,000 white bikes to distributed for public use. A rejection by the city hall followed, with the argument being: 'they said that the bicycle belongs to the past. They saw a glorious future for the car' (idem). Only in 1975, a public bike share system was successfully launched in the national park de Hoge Veluwe.

An important reason for its success was the environment. As the bicycles had to stay in the park, there was little room for theft (deMaio, 2009).


PROVO'S FIETSENPLAN

AMSTERDAMMERS!
DE ASFALTTERREUR VAN DE GEMOTORISEERDE BOURGEOISIE HEEFT LANG GENOEG GEDUURD. DAGELYKS WORDEN MENSEN-OFFERS GEBRACHT VOOR DE NIEUWSTE AUTORITEIT WAAR-AAN HET KLOOTJESVOLK ZICH HEEFT OVERGELEVERD: DE AUTO-AUTORITEIT. DE VERSTIKKENDE KOOLMONOXYDE IS ZYN WIEROOK, ZYN BEELTENIS VERPEST IN DUIZENDVOUD GRACHTEN EN STRATEN.
**PROVO'S FIETSENPLAN** BRENGT BEVRYDING VAN HET AUTO-MONSTER. **PROVO** LANCEERT DE
**WITTE FIETS, IN OPENBAAR BEZIT.**
DE EERSTE WITTE FIETS WORDT/IS WOENSDAG 28 JULI OM 3 UUR 'S MIDDAGS AAN PUBLIEK EN PERS AANGE-BODEN BY HET AMSTERDAMS LIEVERDJE OP HET SPUI, DE VERSLAAFDE CONSUMENT.
DE WITTE FIETS IS NOOIT OP SLOT. DE WITTE FIETS IS HET EERSTE GRATIS, GEKOLLEKTIVISEERDE VERVOERMIDDEL. DE WITTE FIETS IS EEN PROVOKATIE VAN HET KAPITALISTIES PRIVÉ-BEZIT; WANT
**DE WITTE FIETS IS ANARCHISTIES.**
DE WITTE FIETS KAN GEBRUIKT WORDEN DOOR WIE HEM NODIG HEEFT EN MOET ONBEHEERD WEER ACHTERGE-LATEN WORDEN. ER ZULLEN MEERDERE WITTE FIETSEN KOMEN TOT IEDER VAN HET WITTE VERVOER GEBRUIK KAN MAKEN EN HET AUTOGEVAAR GEWEKEN IS.
DE WITTE FIETS SIMBOLISEERT EENVOUD EN HYGIENE TEGENOVER DE PROTSERIGHEID EN VUILHEID VAN DE AUTORITAIRE AUTO. IMMERS EEN
**FIETS IS IETS, MAAR BYNA NIETS!**
**PROVOKATIE № 5 - PROVO** ANARCHISTENBLAD
Provo-arch. no.

**Figure 1:** Pamphlet White Bike plan, 1965. Source: Website Amsterdam Museum, n.d.

The second generation commences in 1991 in Farsø and Grenå, Denmark, and in 1993 in Nakskov, Denmark (deMaio, 2009). It was a modest program with 4 stations and 26 bikes. In 1995 an improved and more formalized version was launched in Copenhagen as *Bycyklen*, or City Bikes. However, the anonymity of the user still led to large amount of theft, giving rise to a new generation of PBSS (ibid).

The third generation was born in in 1996 at Portsmouth University in England, *Bikeabout*, with a variety of technological improvements, such as electronic locking racks or bike locks, telecommunication systems, smartcards and mobile phone access (deMaio, 2009). Although a few programs were launched in cities like Munich and Rennes, it was not until the city of Lyon launched a large scale PBSS called *Velo'v*, with 1500 bikes sponsored by JCDecaux, which had a significant impact on the future of public bike sharing systems. After the success in Lyon, Paris adopted the policy and soon after the first launch expanded the system to over 25,000 bikes (idem). After Paris, other

European cities quickly followed suit. From 2008, PBSS were launched in non-European countries such as Chilli, China, New Zealand, South Korea and Brazil. The city of Hangzhou, China, developed a massive PBSS, growing its fleet of 4,900 in 2008 to 97,000 bicycles in 2016 (ITDP, 2018). Moreover, since the inception of the *dockless* bicycles in 2014, Shanghai reported to house over one million bicycles in its streets.

The recent emergence of *dockless* bikes hints to a new generation of PBSS. Besides the different technology, the introduction of dockless bikes has led to new resourceful private actors that have entered the market. PBSS in general, but dockless bikes in particular form an important part of the emerging shared economy and efforts to digitalize mobility services (Nikitas et al., 2017). Recent research suggests that China alone hosts over 70 dockless brands, which include more than 130 million users (Shi et al., 2018). Finally, the implementation of electric pedal assistance (e-bikes) in PBSS could also add to the distinct features of this new fourth generation.

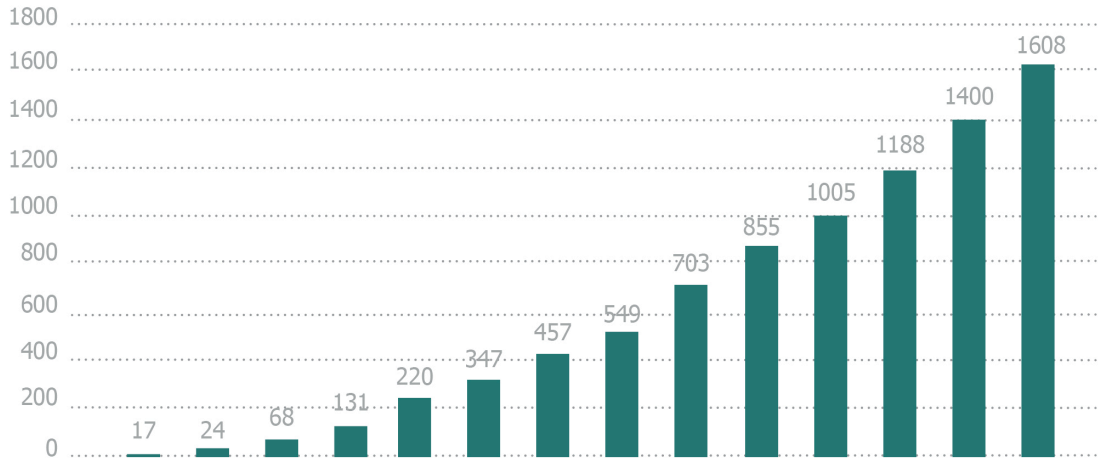



**Figure 2**: Growth in number of public bike sharing systems around the world. Adopted from: Fishman & Schepers (2018).

By 2018, over 1600 PBSS had been launched across the world (see Figure 2). The amount of shared-bicycles between 2016 and 2018 grew from 2,3 million to 18,2 million. It is worth noting that 82% of this growth is to be explained as a result of companies and city governments in China launching major *dockless* bike plans (Rabello, 2019).

### 2.2.2. Provision Models & Benefits of PBSS

Besides user-tracking technology, new financing models ensured the longevity and success of many programs. The ability for commercial actors to (co-) finance the programs in exchange for advertising opportunities in public space

has been an important instrument to finance PBSS (Rabello, 2019). Since the early '90s, various provision models have been implemented. Table 1 provides an overview of the most important differences in provision models, based on deMaio (2009).

**Table 1:** Overview of PBSS provision models. Source: based on deMaio (2009). Author's own elaboration

| Model of Provision | Characteristics | Examples |
|---|---|---|
| **Government model** | Government has great control over the program, allowing it to adjust to certain conditions and determine station locations. An important con is that they can form a large liability for the government. | Bicibur (Burgos, Spain) |
| **Transport agency model** | A quasi-governmental organization provides the service. National rail agencies form main examples and can better connect their existing transport services with first and last mile bike-sharing systems. Advantages are that these agencies are already equipped with transit knowledge and capacities and often serve public interests, rather than generating profit only. A detriment is that if no tender is released, no private parties, who might be a more efficient operator, cannot compete. | OV Fiets (Netherlands); Call a Bike (Germany); Bixi (Montreal, Canada) |
| **Non-profit model** | Non-profit organization purposefully dedicated to the program often runs the operation, and is often publically funded. Drives public interests and takes the direct liability away from the funding government party. Still, a con is that it relies on the public sector for funding. | Bycyklen (Copenhagen, Denkmark); Nice Ride Minnesota (Minneapolis, USA) |
| **Advertising company model** | Large companies offer PBSS to a jurisdiction in exchange for advertising opportunities in public space. In this case model, the government still usually receives the revenues, potentially creating moral hazard for the company does not have the same incentives to operate the program when it would be there responsibility. | Vélibs (Paris, France) |
| **For-profit model** | This model's model maintains little government involvement: private actors finance and operate the system and is only regulated by the government. In the São Paulo case, companies pay a jurisdiction a fee for advertisements and operations in public space. Benefits include low government costs, or even profits. A detriment is that it is profit driven, and might impede public interests in terms of inclusive transport access. | Bike Itaú (various cities, Brazil), Yellow (São Paulo, Brazil) MoBike (various cities, China) |

The benefits of PBSS are widely acknowledged. In a literature review on PBSS, the following advantages are mentioned: emission reductions, individual financial savings, reduced congestion, health benefits and support for intermodal connectivity (Fishman et al., 2013). Some effects, such as emission reductions and intermodal connectivity, have been demonstrated empirically (see deMaio, 2009). Other effects, such as supposed health benefits have not been proven yet, although the positive effects of cycling on health in general are well known (Andersen et al. 2000). According to Rabello (2019), these advantages create incentives for governments to invest in more cycling infrastructure such as cycling lanes. Lastly, stations where PBSS are docked create 'hubs' catalysing and attracting local shops, restaurants, and other neighbourhood amenities. This greatly improves the quality of urban space in the area. All of the presented advantages being true, problems related to theft, vandalism and high cost burdens for public authorities remain persistent (Rabello, 2019).

## 2.3. Public-Private Relationships & The Role of Civil Society

As elicited in the above, the provision of PBSS and broader infrastructure development are known a multitude of possible public-private relationships, each with their own merits and disadvantages. This section discusses these public-private relationships theoretically, whilst introducing the role of civil society as a key agent in infrastructure development.

The rapid urbanization that Brazil faced during the second half of the 20$^{th}$ century gave rise to myriad relationships between private and public actors. Ensuring the provision of sanitation, infrastructure and transport was not only challenged due to the high pace of urbanization, but as a consequence of a lack of public funds. Especially in terms of urban development and transport, the lack of funds and inefficiencies of public service provision have made national and local governments turned towards private sector participation (Koppenjan & Enserink, 2009). This is the case for Brazil too, which has developed a strong reliance on the private sector to provide public services during the 20$^{th}$ century (Marques, 2018).

Public-private partnerships (PPPs) are defined as 'long-term integrated contracts that are used for the provision of public infrastructure' (Hueskes et al., 2017). PPPs, along with market-based governance and private regulation schemes have been presented as an opportunity to address environmental problems (Dellas, 2011; Pinz et al., 2018). PPPs offer many benefits, such as sharing of risks, import of management expertise, increased efficiency, and access to private finance – thereby reducing budget deficits and public administrations costs (Koppenjan & Enserink, 2009; Pinz et al., 2018). Although increasingly popular, they have also resulted in some "uneasy

bedfellows", as expectations and interests between the state and private actors can be misaligned (Brinkerhoff & Brinkerhoff, 2011). Especially in terms of sustainability, short-term private sector interests potentially clash with collective sustainability goals (Koppenjan & Enserink, 2009). In a systematic review of literature on PPPs, Pinz et al. (2018: 16) argue that 'little empirical evidence confirms whether PPPs are appropriate instruments for accomplishing sustainability-related objectives.' They do note that if PPPs are properly managed, 'they may offer the potential to contribute to sustainable development' (idem).

Forms of private-sector participation or PPPs can be differentiated when examining the tasks, risks and responsibilities that have been transferred from a public service provider to a private actor. Between full privatization and full public service provision, Koppenjan & Enserink (2009) distinguish three models of private sector participation in urban infrastructure provision:

(1) **Operation, maintenance and service contracts**: the government pays a private party for a certain service or operation. The private party provides the service under certain standards set by the government.

(2) **Building, operate and invest**: these include contracts in which private investments are brought to the table in order to construct new infrastructure. After an agreed period of time, the project is transferred back to the government.

(3) **Joint ventures**: both the government and private parties invest in a project, sharing costs, benefits and risks.

In order to secure the success of PPPs, management is crucial (Steijn, Klijn, and Edelenbos, 2011). With respect to internal factors, management scholars point towards the importance of public management maintaining influence in order to ensure goal achievement (Kwak, Chih, and Ibbs, 2009). With regards to external factors, Kwak, Chih, and Ibbs (2009) emphasize the necessity to establish a 'coordinating and supportive authority', as objectives may vary between public agencies. Also, they recommend a workable procurement framework, entailing fundamental elements such as a clear-defined scope, fair treatment of competitors and transparency. Lastly, they stress the importance of the active involvement of the government in all project cycle phases (Kwak, Chih, and Ibbs, 2009).

Moving beyond relationships between public and private actors, civil society actors have increasingly been underscored as a key agent in building a sustainable city (Banister, 2008; Geels, 2012; De Sá, 2019). The role of civil

society is both directed to the state, as to businesses. In terms of the role towards the state, Banister (2008: 76) argues that 'public acceptability is core to successful implementation of radical change, and it must involve community and stakeholder commitment to the process of discussion, decision-making and implementation'. In an empirical study on PPPs with ecological sustainability objectives, Dellas (2011) argues that adequate stakeholder participation can enhance the legitimacy for PPPs.

Public acceptability is also related to embracing sustainable business innovations. Especially in the field of mobility, where the automobile is embedded in deep-seated socio-cultural values and belief systems, civil society play a role in fostering normative change amongst the public. The consequent change in consumer preferences can reorient private actors' commercial activities and innovation plans (Geels, 2010). The importance of these interrelationships is underlined by Banister's (2008: 79) call to 'need to understand behaviour [of all stakeholders], and to explore the means by which cooperation and support can be obtained, so that real change can take place'. The next section lays out the Multi-Level Perspective, introduces its theoretical adaptions and discusses how the roles and relationships of different actors are analysed.

## 2.4. The Multi-Level Perspective Framework

Interest in studying transitions has increased rapidly since the emergence of a global awareness of our current environmental issues. The 1987 UN Brundtland report *Our Common* Future urged a move towards sustainable development, defined as 'meeting the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987: 43). Ever since, many different disciplines have studied important elements fostering and hampering a transition towards broad sustainable development, often containing blind spots for other relevant factors at play in processes of high complexity and non-linear dynamics. While acknowledging the importance of excavating transitions from unitary discipline perspectives, the Multi-Level Framework (MLP) takes a synthesis approach. This allows the researcher to understand *how transitions take place*, in effect studying stability and change (Geels, 2012).

Transitions are defined as 'major technological transformations in the way societal functions such as transportation, communication, housing, feeding, are fulfilled' (Geels, 2002). As we will see, they do not only involve technological changes, but also changes in practices, regulation, actor involvement, infrastructure and symbolic meanings (ibid). Its main concepts are three analytical levels that are at continuous interplay: niches, socio-technical regimes and the landscape (see Figure 3).

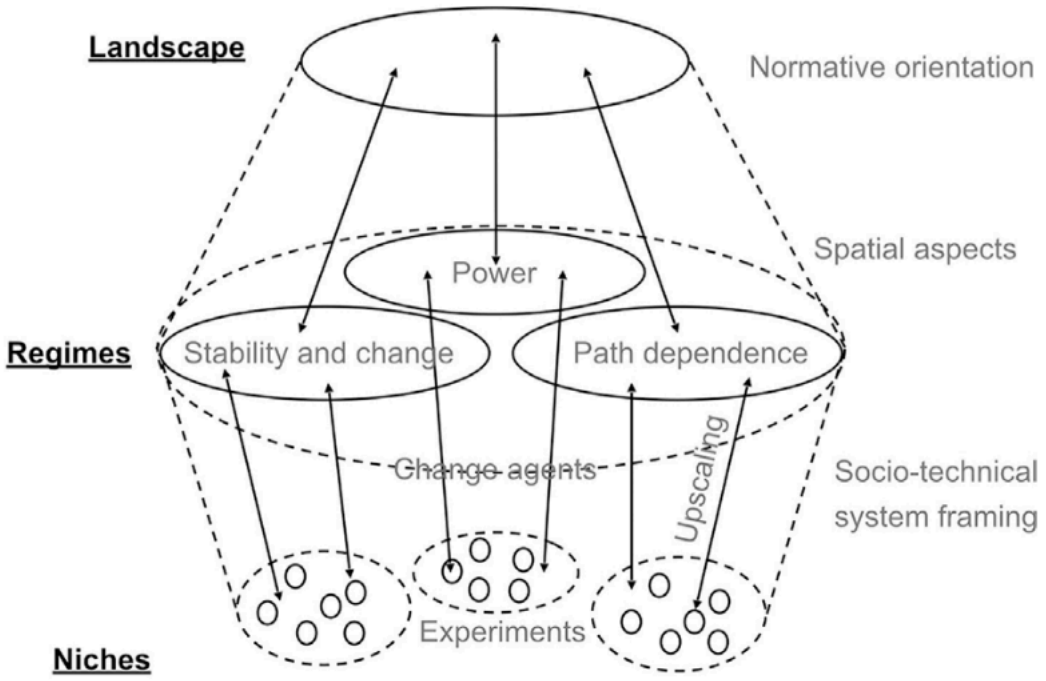



**Figure 3:** Multiple analytical levels with differences in structuration degree. Source: Wieczorek (2018).

## Landscape

The socio-technical landscape is an encompassing concept for all exogenous factors that exert influence on the socio-technical regime and the niches. It is the wider context, both material and immaterial, which includes spatial structures (e.g. urban elements such as buildings and roads), societal values, beliefs, concerns, the media landscape and macro-economic trends (economic growth, oil prices) (Rip & Kemp, 1998). Hence, the elements are characterized by a structural nature. Although there is change within the landscape level, it is slower than at the regime level (Geels, 2002). Besides large structural trends, sudden global events (i.e. oil crises, pandemics) could also open up windows of opportunities for niche actors to alter the regime (idem). It is therefore sometimes criticized as a 'garbage can' for all residual factors that seems to contain little analytical rigour (Geels, 2011: 36). Still, these factors can be formed into one category, as they cannot be influenced by the socio-technical regime or niches in the short run (Van Driel & Schot, 2005).

Whereas landscape factors are often seen to be important catalysts in forging 'windows of opportunity', Geels et al. (2011) argue that landscape factors such as globalization, increased income and socio-cultural beliefs have increased car ownership and perpetuated automobile-dominated societies. For São Paulo, as will become clear in the final results chapter, landscape factors

such as Sao Paulo's geography, urbanization trends and the urban fabric that was built still form important barriers that hamper a cycling transition.

## Socio-Technical Regime

Every activity of an actor operating in a specific system is affected by their embeddedness in a socio-technical regime. This socio-technical regime is defined as 'the semi-coherent set of rules carried by different social groups' (Geels, 2002: 1260). The socio-technical regime is characterized by its relative stability, as a result of various lock-in mechanisms and power enforcing the existing regime. Incumbent actors aim to continuously innovate, but this happens on an incremental level due to lock-in mechanisms and path dependence (Geels, 2012). Some of the lock-in mechanisms that originate from the landscape that resist change are: infrastructure, laws and regulation, consumer beliefs and lifestyles, and resistance from actors with vested interests operating in the regime (Unruh, 2000).

São Paulo's transport and mobility regime is still dominated by the automobile, complemented by public transport (Rolnik & Klintowitz, 2011; Requena, 2018). According to Requena (2018), important actors perpetuating the regime are mostly political and institutional actors (city government of São Paulo, Secretary of Mobility and Transport, Traffic Engineering Company, SPTrans) and interest groups (car industry and bus operators).

## Niches

Most change in socio-technical systems comes from innovations that originate from the niche level. Niches are protected areas where various actors work on new products, services and processes that aim to alter the existing regime's technologies and practices. The concept niche stems from evolutionary economics, a tradition referred to as Strategic Niche Management (Kemp et al., 1998). Due to their protection from the incumbent market dynamics, niches are seen as incubation rooms for radical novelties (Schot, 1998). As with most innovations at their inception, production costs are relatively high, and often have a low performance. Although many innovation processes have been studied from a heroic entrepreneurial perspective (e.g. Edison), more recent literature points to the role of citizens and other stakeholders in fostering sustainable innovations (Banister, 2008).

The niche studied here entail actors involved with cycling in general, and public bike sharing systems in particular. Due to its sustainability objectives, this niche can also be referred to as a 'green niche' (Geels, 2011). This green nice involves private actors operating PBSS (Tembici; Grow) and civil society organizations advocating more bike use in the city. The civil society organizations studied in this thesis compromise 'cycloactivist organizations'

and institutional actors such as think tanks and philanthropic organizations. Cycloactivist organizations are non-profit organizations aiming to promote more bicycle use, using activist tactics as a means to achieve their goals. Public actors (city government, including various secretaries, departments and planning authorities) are not part of the niche as a whole, but various individuals within state bureaucracies do play an important role for the niche in transforming the regime, as will become clear in the results section.

Both public bike share systems and people using privately owned bicycles thrive on crucial cycling infrastructure such as cycling lanes, traffic lights and auxiliary infrastructure such as bike racks. They are mutually constituted as they reinforce each other: shared-bike users are more likely to cycle using their own bikes and vice versa. The advocacy for cycling infrastructure by civil society organizations thereby plays an important role for PBSS too.

## Multi-Level Dynamics

The MLP is an open framework, which allows for an inductive scrutiny of co-evolutionary dynamics. It is used as a heuristic device, which allows a space to analyse broad, multi-dimensional topics. In order to do so successfully, the application of this framework requires "substantive knowledge", "theoretical flexibility" and "interpretive creativity" to comprehend patterns and mechanisms (Geels, 2011). Following the conventional MLP approach, this study employs a process theory approach, in contrast to a variance theory. It aims to understand *how* something happened, instead of *why* something happened. It does so by exposing underlying mechanisms through the sequences, timing and conjuncture of events (idem).

Geels (2012) has formulated a conceptual model of the ideal-type representation explaining how the three analytical levels interact during a socio-technical transition (see Figure 4). The approach holds that (a) various niches build up internal momentum by various learning strategies, (b) landscape developments pressure the socio-technical regime, (c) which in turn opens up windows of opportunities for niche innovations to enter, alter and possibly topple existing regime practices. Note that there is no simple causal relationship: there is no single driver or variable pushing the transition. Geels (2012) holds that instead unexpected linkages, tipping points and thresholds are emphasized in transitions. Important to iterate here is the notion that agency does form an important part in the MLP: private actors and social groups play a significant role in the trajectory of the transition and the multi-level alignments. However, transitions do not always succeed, as there might incumbent interests hampering transitions, innovations failing to gain momentum, or a lack of windows of opportunity (Geels, 2012).

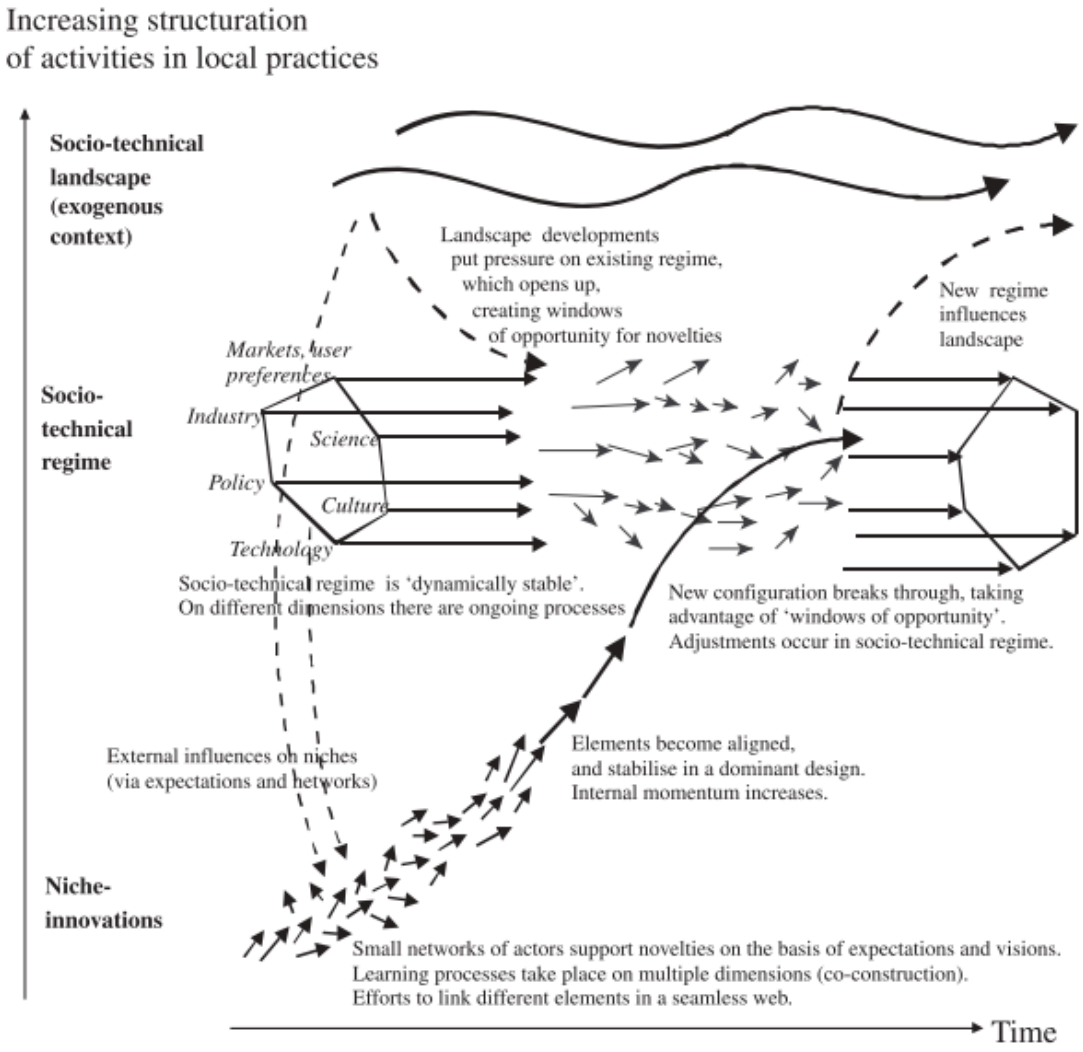



**Figure 4:** Conceptual model of the Multi-level Perspective on transitions. Source: Geels, 2012.

As Ramos-Mejía et al. (2018) state: little attention has been paid to the limitations of using the MLP framework outside European countries. More specifically, little is known how the MLP functions in the context of a mixture of well- and ill-functioning institutions, market imperfections, clientilist and social exclusive communities.

São Paulo houses severe social segregation and inequality expressed in terms of privatized versus public transport mobility, which is correlated with economic conditions (Requena, 2016). Ramos-Mejía et al. (2018: 221) suggest that in contexts of ill-functioning institutions, more powerful actors who benefit from unsustainable socio-technical systems would tend to impede transition processes. Where most transition literature is focussed on the environmental sustainability in terms of production-consumption systems, little attention is paid to 'socio-institutional' sustainability (Romijn et al., 2010). This socio-institutional sustainability addresses the processes that perpetuate poverty and social exclusion (Sen, 2000) and thereby adds the necessary

element of justice to the desired sustainability transition (Swilling and Annecke, 2012).

## 2.5 Niche Development: Organizational Management and Political Strategies

In order to address the aspect of socio-institutional sustainability to the Multi-Level Perspective framework, some theoretical adaptions are introduced. Although 'policy' is one dimension of the MLP, the underpinning fundamentals of politics and power are underexposed in socio-technological transition theory (Meadowcroft, 2011; Geels, 2011). While there have been some exploratory studies introducing politics in the framework, such as Geels (2012) and Elzen et al. (2011), the conceptualization of the relations between different actors struggling for power has been limited and restraint to affluent countries in the Global North. Particularly, the roles and relationships between regime actors and niche actors are poorly understood in transition literature (Geels, 2011).

Carlos et al. (2016: 3) propose two dimensions to analyse collective action in relation to public policies: (i) dynamics of actors and (ii) their interaction with the political context. Although a description of niche development is facilitated with the proposed methodological approach, theoretical opaqueness lures. Therefore, an adapted framework combining Elzen et al. (2011) and Carlos et al. (2016) has been used. Three dimensions have been analysed to study niche development, and their roles in relation to the State: framing, organization and resource mobilization, and interaction with political structures and opportunities.

*(1) Framing*

Framing plays an important role in constructing or changing the narrative of the public debate, allowing actors to shape the discourse of the issue and consequent views of other actors (Hajer, 1995). Issues do not have meaning in themselves, but are socially constructed. "Framing" thus is a process through which actors define problems, attribute causality and responsibility, and generally influence the meaning of issues or problems. Following Elzen et al. (2011), the strength of mobilization potential is influenced by (i) the focus of the frame (too many issues could lead to dilution), (ii) empirical credibility (to what extent does the frame fit with the on-going events), (iii) cultural resonance (fit with broader cultural symbols, discourses), (iv) emotional-normative appeal (what images, metaphors are used).

*(2) Organization and resource mobilization*

The mobilization of financial and non-financial resources is crucial to influence incumbent actors. Important resources are: members, money, networks,

expertise, credibility and contacts (Elzen et al., 2011). Normally the following holds truth: the more resources, the more power (McCarthy and Zald, 1977). To what extent niche actors can mobilize and capitalize these resources is for a large part determined by the form of organization. Special attention is paid to analysing the formalization, professionalization of and collaboration between different niche actors.

*(3) Interaction with political structures and opportunities.*

Recognizing that civil society actors and the state operate in a larger social spectrum with exogenous factors influencing interaction dynamics, Carlos et al. (2016: 3) argue that 'both the societal configuration and the political context matter when explaining the outcomes'. Political opportunity structures such as the strength of the state versus civil society and private actors, socio-institutional frameworks and larger socio-political developments matter in influencing the political change (Elzen et al., 2011; Romijn et al., 2010). Windows of opportunities, coherent with important sudden events in the landscape dimension as described in the section above, could lead to reorganization of political structures. The capacity to interact with the political structures, as well as capitalize on political opportunities are important in understanding policy outcomes produced by niche actors (Carlos et al., 2016).

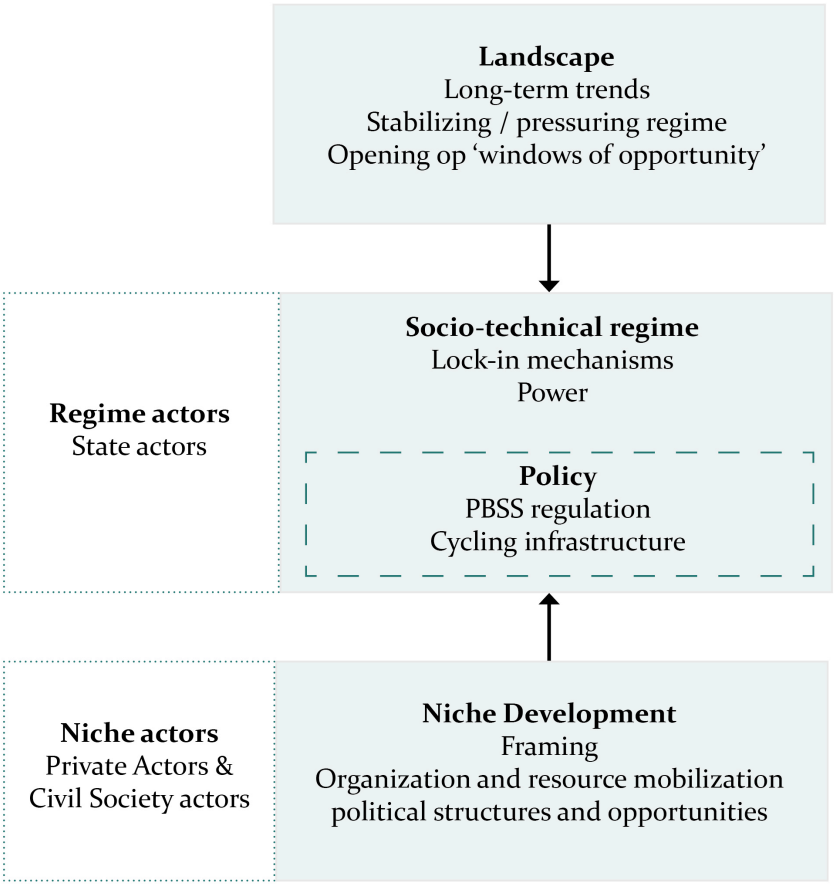



**Figure 5**: The conceptual model.

Figure 5 shows the conceptual model. The model should be understood as an elaboration of the MLP conceptual model presented in figure 4. The general process of niche-regime-landscape dynamics stay the same: niches build up internal momentum by various learning strategies, while penetrating the regime during windows of opportunity created by landscape developments. More specifically, this model shows how through niche development, niche actors (private actors & civil society actors) aim to reconfigure the policy dimension by interacting with regime actors (state actors). The ability to which niche actors are successful in altering the socio-technical mobility regime, is in this adapted model dependent on to what extent niche actors use the right frames, are well organized and have sufficient resources, and attain favourable political structures.

# 3. Methodology

This is a qualitative research, deploying a case study analysis on the city of São Paulo. The use of qualitative methods, based on primary and secondary sources, has allowed for a thorough analysis of the complex interaction between the three multi-dimensional levels. This section outlines the methodology in further detail, by respectively describing the research strategy, data sources, data analysis, limitations and case context.

## 3.1. Research Strategy

Figure 6 presents the research framework. It is comprised of three main analytical steps. The first step has been completed in the section above: it discussed relevant literature and presented the conceptual framework. Results are presented in the next chapters, with each subquestion being answered in a dedicated chapter. The final step compares the findings with the literature, whilst providing policy recommendations, and ends with the conclusion.

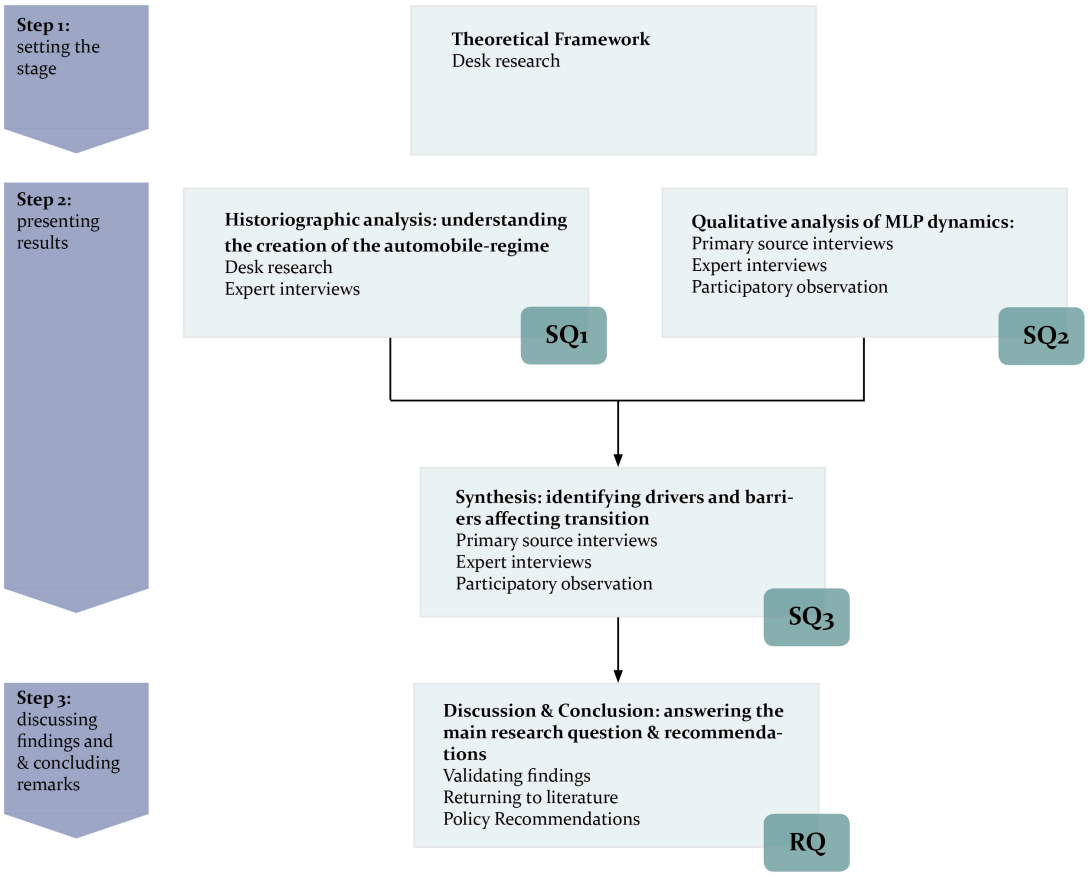



**Figure 6**: The research framework.

## 3.2. Data Sources

Data for this research has been collected through various sources and methods. Five months of field research between October 2019 and March 2020 have

allowed for the data collection, constituting 25 semi-structured interviews, participatory observation and desk research.

Subquestion one discusses how the current transport and mobility regime has developed over time by providing a historiography, primarily based on desk research, complemented by expert interviews. The historiography was deepened using quantitative data from six subsequent Origin-Destination surveys (1967-2017), showing changes in mobility patterns between different economic groups of society. Demographic context and infrastructural data is analysed using data provided by the municipality of São Paulo's online tool GeoSampa[1] and Traffic Engineering Company (TEC) reports.

The second subquestion addresses the promotion of a transition towards sustainable urban transport by private and civil society actors. In order to answer this question in-depth semi-structured interviews have been conducted with primary and secondary sources. The first respondents were chosen on the basis of purpose sampling, followed by snowball sampling.

The primary sources constituted four respondent groups: private actors, civil society actors, administrative actors, and political actors. Private actors entail managers working for PBSS operators Tembici and Grow. Civil society actors constitute prominent cycloactivists of three consecutive generations (including important individuals, and various founders, directors and managers from different cycloactivist organizations). Political actors constitute the former Secretary of Mobility and Transport. Administrative actors constitute employees from TEC [the municipal department responsible for road planning in São Paulo] and the Department of Mobility and Transport. Secondary sources primarily included scholars studying São Paulo cycling policy, helping to triangulate data from primary sources. The analysis was complemented by participatory observation methods providing valuable insights in collaboration between cycloactivist organizations and public support programs. The author visited a cycloactivist organizations' plenary, and two public events organized by cycloactivist organization CicloCidade.

The third subquestion concerns the drivers and barriers of the transition. It forms a synthesis of the analysis done in subquestion one and two. Based on the interviews with all different actors (political, administrative, private and civil society), drivers and barriers have been formulated.

Table 2 provides an overview of the respondents interviewed. The large majority has been interviewed in a face-to-face setting, with some exceptions being interviewed through Skype or a phone call (see Appendix A for a more detailed overview). Field observations, reports and journal articles have been used to further triangulate the obtained data from interviews.

[1] www.geosampa.prefeitura.sp.gov.br

**Table 2:** Number and type of respondents interviewed.

| Expert/ Organization | Organization type | Number and type of respondent |
|---|---|---|
| Experts | Various | 4 mobility scholars<br>1 mobility consultant<br>1 mobility institute director |
| Tembici | Private Actor (PBSS operator) | 1 manager,<br>2 urban planners |
| Yellow (Grow) | Private Actor (PBSS operator) | 1 manager |
| Municipality of São Paulo | Government | 1 secretary of transport and mobility<br>1 bus policy director (SPTrans)<br>2 PBSS policy coordinators (Secretary)<br>1 urban planner (TEC) |
| CicloCidade | Civil Society | 1 co-founder<br>2 directors<br>1 researcher |
| Participatory space representatives | Civil Society | 1 ex-CTB member<br>2 current Council/CTB members |
| BikeZonaSul | Civil Society | 1 researcher |
| BikeAnjo | Civil Society | 1 manager |
| Aliança Bike | Civil Society | 1 director |
| Bike é Legal | Civil Society | 1 founder |
| Other | Civil Society | 1 ex-activist |

## 3.3. Data Analysis

The interviews have been transcribed and coded in NVivo 12 software. A subsequent content analysis was performed based on relevant themes per subquestion, each with multiple sub-nodes. Subquestion one used codes to distinguish different historical periods and events. Subquestion two used the main concepts elicited in the conceptual model, such as framing, organization type, political structures and opportunities. The analysis resulted in the historical differentiation of three niche development phases as described in chapter 5. The landscape, regime and niche were main codes used to elicit drivers and barriers for subquestion as described in chapter 6, each containing sub-nodes.

## 3.4. Considerations and Limitations

Some limitations are important to note. First, as the methods used in this case study are predominantly qualitative, its data analysis is inherently subject to interpretation. Following Verschuuren en Doorewaard (2010), this research

aimed at ensuring an objective representation of reality by systematically and transparently presenting, analysing and discussing the data. Where possible or necessary, statements by respondents were triangulated through other interviews, secondary literature or quantitative data.

The large majority of respondents can be seen as experts on cycling policies or business, working almost daily with the issue at stake. No ordinary cyclists have been interviewed, possibly creating certain biases. However, as the respondents are often cyclists themselves, whilst stemming from diverse backgrounds, this issue is largely overcome.

Although the author is able to express itself in Portuguese, not being a native speaker has led to occasional difficulties during interviews conducted in Portuguese[2]. Nevertheless, the recordings and following transcriptions have resulted in recuperation of possible omissions during the face-to-face interviews.

The respondents represent a gender composition of 64% female and 36% male. Although slightly skewed towards female respondents, this had the advantage in helping to better understand the barriers impeding women to cycle.

Lastly, it should be noted that the transition in São Paulo is still in process. Conclusive answers about a 'completed transition' towards clean and inclusive mobility can therefore not be given. Moreover, shared-bike use and cycling seem to be in the early phase of adaption only. Still, this does not have to be problematic. On the contrary, transition literature often takes a problem-oriented approach, aiming to study green niche development and provide recommendations to further develop accelerate the desired transition.

## 3.5. Case Context

In studying clean and inclusive mobility in the Global South, São Paulo has been chosen as a case study for multiple reasons. First, besides being one of the most important economic metropolises of the Global South, it also faces some of the worst transport conditions. In a population survey by NGO *Rede Nossa São Paulo*, researchers found that citizens spend an average 2.43hr per day travelling (Rede Nossa São Paulo, 2018). Other survey reports also show high levels of dissatisfaction about the city's mobility situation. Figures on time to travel the city (3,4/10), public transport (3,8/10) and the general traffic situation (2,7/10) are some significant examples. Currently, São Paulo is the 5$^{th}$ most congested city in the world (Inrix, 2018), with air pollution levels being above WHO standards (Abe & Miraglia, 2017).

[2] 11 out of 25 interviews have been conducted and transcribed in Portuguese.

Car ownership in Brazil lies at 350 per 1,000 people, which is the highest in Latin America and one of the highest in the Global South (Denatran, 2018). With a Gini coefficient of 0,53, Brazil is defined by high levels of economic inequality, but comparable to other developing countries (World Bank, 2017). Inequality is also reflected geographically in the city of São Paulo: poorer populations living in the peripheries of the city tend to commute significantly longer (Requena, 2016). Further background information about the case study area is noted in the table below (see Table 3).

**Table 3:** Background information of São Paulo**.** Sources: ITDP, 2015; IBGE, 2019.

| São Paulo |
|---|
| • São Paulo covers an area of 1,521 km² (New York: 783.8 km², Lagos: 1,171 km²).<br>• The municipality houses approximately 12mln inhabitants, the larger metropolitan region 22mln.<br>• Having the largest GDP in the Southern hemisphere, the city accounts for 10,6% of GDP for Brazil.<br>• The city is paved with 17,000km of asphalt. |

## Public Bike Sharing Systems

Three different PBSS have been present in Sao Paulo within the last decade. Although a more thorough analysis of PBSS in São Paulo will be presented in the results chapter, table 4 gives a brief overview of the three PBSS that have been active since 2012. Figure 7 shows the PBSS stations of BikeSampa and CicloSampa and the most recent service area of Yellow. Southwest areas of the city centre contain most employment opportunities and middle to upper class neighbourhoods.

**Table 4:** Background information about PBSS in São Paulo**.**

| Public Bike Sharing Systems in São Paulo |
|---|
| • **Bike Sampa (also Bike Itaú)**<br>  ○ Offers station-docked bikes.<br>  ○ Operated by mobility service provider Tembici and financed by commercial bank Itaú.<br>  ○ Holds 260 stations with 2700 bicycles in central parts of town.<br>  ○ Started in 2012 and is active at moment of writing (2020).<br>  ○ After taking the bike, users have to dock the bike within one hour.<br>  ○ Costs are R$12 per day or R$160 per year.<br>  ○ Operates one larger station in peripheral area of the city (Cidade Tiradentes) with a different operating model. Here, users can take the bike for 12hrs for the same price of an hour. |

- **CicloSampa**
  - Offers station-docked bikes.
  - Operated by mobility service provider Sertell and financed by Bradesco.
  - Holds 19 stations with 150 bikes in central parts of town.
  - Started in 2012 and is active at moment of writing (2020).
  - After taking the bike, users have to dock the bike within one hour.
  - Costs are R$6 per 30min.
- **Yellow**
  - Offered dockless bikes.
  - Operated and financed by Yellow
  - Released 500-10,000 bikes in central parts of town.
  - Started in 2018, but retracted business in early 2020.
  - Costs were R$1 per 15min.

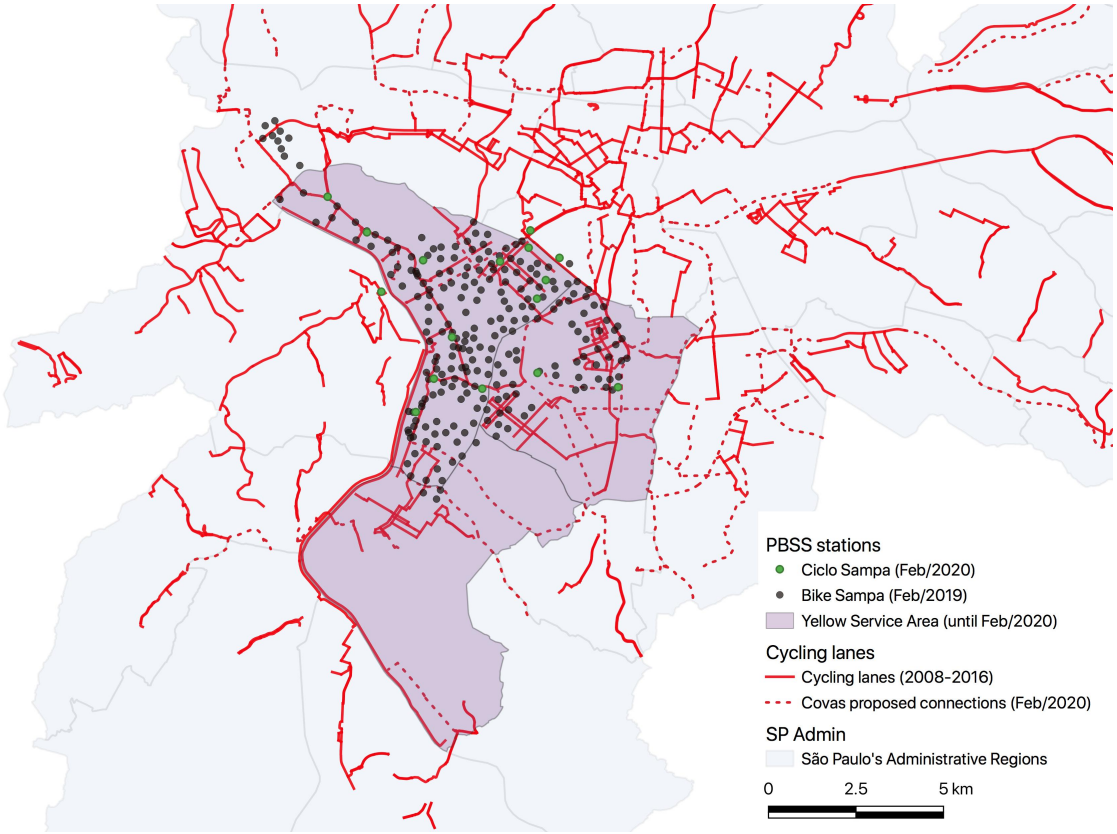



**Figure 7:** PBSS stations and service areas in São Paulo. Source: Tembici open data[3]; Website Ciclosampa[4], Yellow App. Author's own elaboration.

The case context demonstrates the relevance and importance of taking São Paulo as a case study. The city is facing imminent issues related to urban mobility, reflected both in statistics and population surveys. Next, as in many Global South cities, growing car ownership per capita is posing problems to

[3] Author received open data from BikeSampa's operator Tembici.
[4] See https://ciclosampa.pegbike.com.br/ciclosampa/index.php.

environmental targets; while socio-economic inequalities linked to mobility remain a problem. Three public bike sharing systems have emerged since 2012, underscoring the significance of the recent phenomenon in the city. How the car-regime and cycling niche have developed and interacted is presented in the subsequent results chapters.

# 4. Results: Historiographical Analysis

## 4.1. Formation of São Paolo's Car-Centred Mobility Regime

This chapter answers the first subquestion, examining how motorized transport became dominant in São Paulo's socio-technical regime in the 20th century. It does so by analysing three periods in São Paulo's modern history of urban mobility. The division of periods is based on political, cultural and technical dynamics on a regime and landscape level, which have had an important effect on the consolidation of the socio-technical mobility regime. First, the early history of São Paulo's urban development is discussed. Next, the most relevant policies carried out during the regime of Getúlio Vargas are elicited. The third section discusses how the centralist military dictatorship consolidated the car-centric model.

The analysis presents three main arguments. First, it shows that from the 1930s onwards, a car-centric city was designed, which created multiple lock-in mechanisms favouring stability of the automotive regime. Second, this chapter shows that although large swats of people were cycling, transport policy primarily favoured the car, privileging middle classes and the elite. Third, it proposes the consequent argument that the lack of democratic politics resulted in an undemocratic distribution of urban space.

### 4.1.1 São Paulo's Urban Development in the Early 20th Century (1900s-1930s)

Taking in the massive size of metropolis São Paulo today, it is hard to imagine that little over a hundred years, São Paulo was a small city. It contained only an approximate 60,000 people in 1889, the year of the proclamation of The Republic of Brazil.

The European-minded São Paulo elite imported road bikes from Europe since the late 19th century, using them for competitive sports in a velodrome. However, cars were already present in the city, and as soon as 1915 the velodrome was demolished to make room for a street (Lindenberg Lemos, 2020).

In the first years after the dawn of the 1900s, Brazil launched its first electric trams and a municipal train station together with the commercial electrification of São Paulo – which remained a privilege for the wealthy few for the next decades to come. For the majority of the population, mobility was still dominated by feet and animal powered carriages. Many former enslaved people now travelled through the city as pedestrians, with a resulting judgement of inferiority amongst the white elite towards walking: an inheritance of hundreds of years of slave culture (De Sá et al., 2019).

Until the first presidency of Getúlio Vargas in the early 1930s, the predominant mode of transportation was collective rail transport (trams and trains). According to the important transport engineer Mário Lopes Leão (1945), São Paulo had a 258km tram network in 1933, three times the size of the current metro network and was responsible for 84 percent of public transport trips (De Sá et al., 2019).

New industrial innovations were almost exclusively financed by the enormous profits made by the booming coffee exports located primarily in the larger São Paulo region. In the following decades, the city grew rapidly, and upper classes could afford the newest innovations in individual motorized transport from the Northern Hemisphere, the most notable example being the car (ibid).

The city purposefully attracted white and Asian immigrants, especially from European countries and Japan. Not just for economic reasons, but also to 'improve' and 'regenerate' the Brazilian people (De Sá et al., 2019), now that former enslaved Brazilians gained freedom and formal citizenship (Holston, 2008). In 1920, one third of São Paulo residents were foreigners, who received well-located housing areas at the cost of black and mixed race people, who were being expelled to peripheral areas of the city (De Sá et al., 2019).

### 4.1.2 Vargasian Modernization

Brazilian cities, especially Rio de Janeiro and São Paulo, faced massive urbanization processes dating from the 1930s onwards. Prior to Vargas' modernization policies, the Old Republic was dominated by the coffee-with-milk political-economy[5]. Due to capitalist modernization processes initiated by Getúlio Vargas, masses of migrants from the poorer, rural Northeast were pulled towards the richer urban areas in the south of the country (Marques, 2016). Urban development policies failed to cope with the large amount of new city dwellers, leading to unemployment and precarious work environments, predominantly in the informal economy. Together with a lack in sufficient housing construction, the autoconstruction of *favelas*[6] led to a strong production of spatial segregation marked by inequalities and precariousness (ibid). Furthermore, the neighbourhoods were characterized by low levels of

[5] Under the Old Republic (1889-1930), the two states São Paulo and Minas Gerais dominated the countries' political economy, both in terms of population and wealth, stemming from their coffee and dairy industry respectively. Although Vargas centralized the state apparatus, regularizing and modernizing state governments, Brazilian politics is still seen as patrimonial and oligarchical, with São Paulo and Minas Gerais remaining dominant states.

[6] Favelas are occupied areas that are defined by their absence of formal land ownership. They are often characterized by low levels of basic urban infrastructure and public services, although areas differ in precariousness (see Marques, 2016).

public goods, as transportation and public sanitation hardly existed. (Avritzer, 2002: 91). Instead of resolving socio-spatial inequalities, the state aggravated the process by constructing large-scale housing projects in the peripheries (Maricato, 1987). While poor migrants occupied these the marginal areas, the elites continued to reside in the better-equipped city centre, culminating in the characteristic segregated peripheralization model.

Marques (2016: 37) argues that due to the substitution of trains and trams (predominant forms of transport in the 1920s) by the bus as the main mode of transport for the poor, further expansion of irregular settlements across the peripheries of the city was enabled. Indeed, buses are able to flexibly travel through all directions, as opposed to track-based transportation, making them more suitable for the improvised urban fabric in peripheral areas (ibid).

Fast immigration and the city's rapid growth triggered a debate on its urban structure, propelled by problems of floods, disease outbreaks and increased traffic, leading to the first urban development plans of São Paulo (De Sá et al., 2019). Brazil, still a highly underdeveloped country became inspired by the modernist ideas that were in vogue in Western societies. These modernist strands of urbanist thought, imported from European countries and the United States, coupled with the fast expanding car industry, led up to the first critical juncture in São Paulo's urban mobility development: the Avenues Plan.

Le Corbusier, one of the world's progenitors of modernism in architecture and urbanism, was invited to Brazil several times in the 1930s to give lectures to Brazilian architects and urbanists. Furthermore, many of Brazil's most prominent architects and urbanists attended the *Congrès Internationaux d'Architecture Moderne* (CIAM) in Paris. Many of the modernist principles such as concentration and verticalization of constructed areas were taken over. The metropolis concept of 'the centralized city' became the idealized model in urban theory, consolidating the peripheralization model. However, one principle, the separation between pedestrian and vehicle traffic was not taken over, resulting in low levels of pedestrian infrastructure until today (Rezende & Ribeiro, 2010).

These modernist ideals were welcomed by the Vargas administration to portray the country as universalist and emerging, closing the gap with developed nations. Architectural hallmarks such as the Ministry of Education and Health in Rio de Janeiro, the *Conjunto National* in São Paulo, and exceptionally wide streets constructed for cars served as symbols for the revitalized nation, the later proclaimed *Estado Novo*. Indeed, these buildings and strands of thought later served as fruitful soil for the construction of the long dreamed new capital Brasília, the epitome of modernist architecture, which started its construction in the late 1950s (Rezende & Ribeiro, 2010).

One of the most significant urban plans culminating from the imported modernist ideas was the *Avenues Plan*, designed by Ulhoa Cintra and Prestes Maia in 1930 (see Figure 8). The objective of the Avenues Plan was to facilitate the new transportation technology, the automobile. The Plan thereby set the tone for the forthcoming era in terms of mobility, marking 'the shift from rail to road transport and from public shared to private individual transport, with perpetual support for cars and motorists over other street users, and priority given to circulation over all other daily activities in public space' (De Sá et al., 2019: 64).

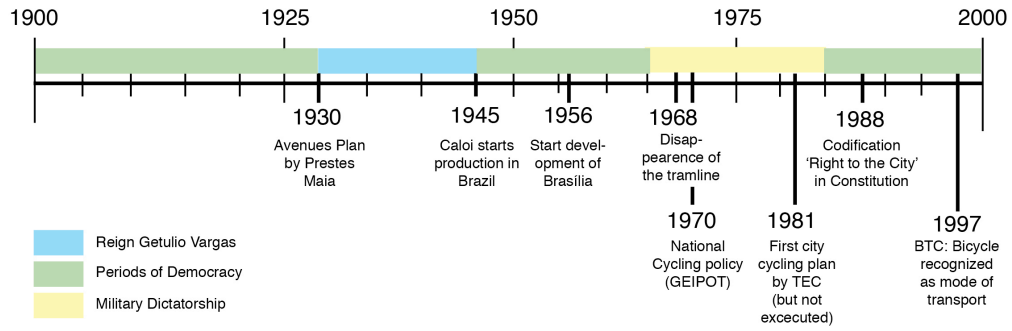



**Figure 8:** Timeline of the 1900s. Author's own elaboration

These measures formed the basis for the concentric model of the city: since the 1930s, various major road projects were implemented in the form of large radial avenues (i.e. Novo de Julho, São João) (Marques, 2016). This created a new centrality; with predominantly higher income groups moving towards the whole downtown area, away from the southwest quadrant only.

Tramlines went into a steady decline the following two decennia, and saw its end in 1968. The expanding private bus fleet, which evolved and grew simultaneously, became responsible for the territorial sprawl of the city from the 1950s onwards (Henry & Zioni, 1995). The ominous housing crisis was brought a solution by the flexibility of the bus service, at the cost of the further expansion of the tram and train lines. The horizon now laid open for an 'infinite horizontal expansion model' of its cities, with the autoconstruction of houses expanding its peripheral borders (ibid).

In the two decennia after the Avenues Plan was proposed, the city government continued to build along the philosophy and design of the plan. In 1949, American urban planner Robert Moses was invited to develop a "Plan of Public Improvements for São Paulo" (Rolnik & Klintowitz, 2011). In the plan, Moses maintained the structure of the Avenues Plan, but reproduced urban designs from New York's 'urban highways', reconstructing Preste Maia's avenues alongside the Pinheiros and Tietê rivers into highways. These highways still function today. In 1956, Preste Maia, having served as mayor twice, was

now invited to design a "Draft of a Metropolitan Rapid Transit System". Despite a proposal to construct a metro network, Preste Maia hold that the continuation of the Avenues Plan should be given priority, constructing the second beltway and crossing various public spaces (Roosevelt Square, Dom Pedro II Park).

Meanwhile, in 1945, Brazil's first bicycle company Caloi opened up a factory in São Paulo, producing its bicycles in Brazil henceforth, as importing parts became too difficult due to World War II. Caloi then produced sturdy, but accessible bikes for the masses, forging an important break with the first half of the 20th century. From the 1950s onwards, the bicycle became predominantly used as a mode of transport amongst the working classes. Immediately recognized as a more efficient mode of transport while affordable, people of working classes began appropriating the bicycle in large numbers (Soares & Guth, 2018). Brazil's most famous football player Pele featured in various bicycle-marketing campaigns, jokingly referring to the famous 'bicycle kick' (overhead kick) (see Figure 9). It marks the increased importance of the cycling industry and popularity amongst the masses to use the bicycle as a mode of transport. Still, although the bicycle was used in great numbers during the '50s and '60s, public policies to further promote cycling as a mode of transport remained absent. Indeed, despite active marketing efforts from industry, there were no civil society organizations present that demanded a cycling policy agenda.


**Figure 9**: Monark advertisement from 1966. Source: pedal.com

### 4.1.3. Military Dictatorship: Consolidation of the Automobile Regime

With the groundwork laid for a car-centric urban model, the military dictatorship (1964-1985) held on to pro-private transport views and consolidated the accompanying urban designs put forward during the 1930s and 1940s (Vasconcellos, 1997; Rolnik & Klintowitz, 2011; Marques, 2016).

Vargas' successor, populist president Juscelino Kubitschek, put forward the action plan "*Cinquento anos em cinco*" (fifty years in five), trying to drastically modernize the country by attracting primarily American car companies and commercializing the television and other consumption goods (Vasconcellos, 1997).

**Table 5:** Population growth in the São Paulo Metropolitan Region. Source: Macrotrends.net. Author's own elaboration.

| YEAR | POPULATION |
|---|---|
| 1950 | 2,334,000 |
| 1960 | 3,970,000 |
| 1970 | 7,620,000 |
| 1980 | 12,089,000 |
| 1990 | 14,776,000 |
| 2000 | 17,014,000 |
| 2010 | 19,660,000 |
| 2020 | 22,043,000 |

In 1960, São Paulo had reached four million inhabitants and about 165,000 vehicles (Vasconcellos, 1997) (see Table 5). The city had grown rapidly in the first half of the 20$^{th}$ century and reached a metropolitan scale; dealing with traffic had become an immanent issue for urban policy. From the 1960s onwards, the main road system began to be expanded covering the entire urban fabric. The importance of car infrastructure for the municipal government also becomes clear when examining municipal budgetary expenditure: between 1965-1970, on average, 27% of the total municipal budget was spent on road expansion (Rolnik & Klintowitz, 2011: 93).

Vasconcellos (1997; 2005) therefore holds that the creation of the automobile city is not the automatic result of adapting urban spaces to deal with increases in automobile traffic. Instead, he argues 'these spatial transformations are definite economic and political undertakings related to capitalist modernization processes, in which the middle classes, as preferential partners of ruling classes, play the most important role' (Vasconcellos, 1997: 293). Middle classes were represented inside the state; predominantly transport

planners who latently or actively promoted the ideology of modernization, in which the automobile industry played a key role. During this important period between 1960 and 1980, where the population grew from 4mln to 8,5mln, the car fleet grew from 165,000 to 1,8mln (idem). Although the large majority of trips were made with collective modes of transport, the military dictatorship centred its policies on constructing a 'middle class city'. By privileging the automobile over public transport and active transport modes, marginalized groups were largely declined of adequate public transport services. As economic policy kept salaries low and political movements were repressed during the highly centralized dictatorship (Vasconcellos, 1997), there were minimal possibilities for citizen's groups to alter the mobility regime.

**Table 6:** Evolution of daily voyages by transport mode in SPMR – 1967-2017. Source: Metro, 1967–2017. Author's own elaboration.

| | 1967 | | 1977 | | 1987 | | 1997 | | 2007 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MODE | (x 1.000) | % | (x 1.000) | % | (x 1.000) | % | (x 1.000) | % | (x 1.000) | % | (x 1.000) | % |
| COLLECTIVE | 4.894 | 68,1 | 9.580 | 62,8 | 10.455 | 56,1 | 10.455 | 56,1 | 10.473 | 51,2 | 15.295 | 54,1 |
| INDIVIDUAL | 2.293 | 31,9 | 5.683 | 37,2 | 8.187 | 43,9 | 8.187 | 43,9 | 11.254 | 44,7 | 12.985 | 45,9 |
| **MOTORIZED** | **7.187** | **100,0** | **15.263** | **100,0** | **18.642** | **100,0** | **20.458** | **100,0** | **25.167** | **100,0** | **28.280** | **100,0** |
| BICYCLE | - | | 71 | 1,2 | 108 | 1,0 | 162 | 1,5 | 304 | 2,4 | 377 | 2,7 |
| WALKING | - | | 5.970 | 98,8 | 10.650 | 99,0 | 10.812 | 98,5 | 12.623 | 97,6 | 13.350 | 97,3 |
| **NON- MOTORIZED** | **0** | **0,0** | **6.041** | **100,0** | **10.758** | **100,0** | **10.974** | **100,0** | **12.927** | **100,0** | **13.727** | **100,0** |
| **TOTAL** | **7.187** | | **21.304** | | **29.400** | | **31.432** | | **38.094** | | **42.007** | |

Table 6 shows the evolution of daily voyages in the São Paulo Metropolitan Region (SPMR). Firstly, it shows that for motorized transport, the share of individual (privatized) transport compared to collective transport has been growing since 1967, illustrating the increased importance of the automobile. Secondly, it shows the significant amount of daily voyages taken by foot, still comprising more trips per day than individual motorized transport. Thirdly, although the amount of trips by bicycle have increased in absolute and relative numbers in terms of non-motorized transport, its increase has been modest.

The 1973 oil crisis formed, as in many countries, a break with road infrastructure spending (Rolnik & Klintowitz, 2011). As a response to the energy crisis, various transport alternatives were explored by the military dictatorship. Primarily, spending on public transport increased in São Paulo. Most was directed to subsidies and capital increases for the public agencies managing the public transport system, accounting for 19% of total municipal spending

between 1973-1980 (in comparison to 11% to the road system) (Vasconcellos, 1997).

Cycling was also explored as a way to mitigate the risks posed by the energy crisis. In the mid '70s, the first bike lane of two kilometres long was built in São Paulo, located along a newly built avenue (Lindenberg Lemos, 2020). In addition, in the beginning of the '80s, more cycling infrastructure plans were designed and published by the recently formed Traffic Engineering Company (TEC) (idem). The first cycling lane designed by the TEC dates from 1980. It linked two parks, promoting the bicycle as a vehicle of leisure (Malatesta, 2012). Still, the bicycle was not formally recognized as a formal traffic vehicle until the late '90s. The reason that TEC did not devise more cycling lanes, was due to its strong "bureaucratic isolation", a protection mechanism of the bureaucratic state against external interferences, from society or other state authorities. The technocratic doctrine was adopted to formulate and implement policies top-down (Requena, 2018: 234). Its engineers were trained internally, with books[7] prescribing the normalization of the road system based on the automobile, with the main objective of ensuring traffic fluidity (idem: 237).

## Subconclusion

By carefully reconstructing some fundamental political-economic dynamics, this section analysed how São Paulo's socio-technical mobility regime became car-centred. It showed how important international schools of urban thought and the politics of urban planning have been on mobility policies. This 'politics of urban planning' means that infrastructure is never neutral. The city was indeed defined and designed 'in a way which favoured the circulation needs of the middle class, in its primary role of driver, rather than the needs of most of the population, in their primary roles of pedestrian and captive public transportation user.' (Vaconcellos, 1997: 294). The highly centralist and isolated TEC was designed not to be receptive for demands from broader segments of society to democratize urban space, purposefully resisting external input from other actors. The urban infrastructure and transport institutions built in the past thereby function as lock-in mechanisms that continue to favour the stability of the automobile regime today.

[7] Engineer and transport scholar Eduardo Vasconcellos worked at TEC between 1976 and 1985, and reported that the most common obligatory readings were based on manuals from the Institute of Transport Engineers, especially the book *Transportation and Traffic Engineering Handbook* (in Requena, 2018: 235).

# 5. Results: Niche Development Analysis

The previous chapter showed how the mobility regime strongly favoured road infrastructure over public transport and cycling policies, privileging middle classes and the elite. Although the bicycle was already used since the '50s, it was only from the '80s onwards that a niche developed that aimed at promoting cycling policies.

This results chapter deals with subquestion two, analysing niche development over time. It studies the roles, relationships and strategies of civil society, private actors and the state. It specifically examines what frames niche actors use, how they are organized, and how they interact with political structures and opportunities. The results are based on semi-structured interviews with important niche and regime actors, complemented by secondary literature to contextualize and triangulate results (see Table 2). Three phases of niche development are distinguished, based on the level of organization of the niche.

## 5.1. First phase: Environmentalism and Cycloactivism ('80s-'00)

Mountain biking, a trend imported during the '80s from the hills of San Francisco, became rapidly popular in São Paulo amongst the middle-classes. Instead of tackling the mountains outside the city, mountain bikes were seen as an excellent leisure activity in the hilly urban landscape of São Paulo. Anticipating on the trend, an industry of specialized mountain bikes surged, fulfilling the demand for high-end mountain bikes for the middle classes.

### Framing

Frustrated by the fact that the city had become increasingly motorized, the first cycloactivists rose. One of the frontrunners was Renata Falzoni, architect and journalist, and founder of the first cycloactivist group *Nightriders* and later bike-portal *Bike é Legal*[8]. Unhappy with always being stuck in traffic when going to university, she decided to ride a bicycle, something very uncommon for a woman in the '70s. By organizing bike rides during the nights, Falzoni aimed at attracting middle and upper class car drivers to ride a bicycle in the city (Falzoni, personal communication, 2020). Although there was a hidden political agenda behind it, making the city more cycling friendly, the rides were focused on leisure:

[8] https://bikeelegal.com/ & https://www.youtube.com/BikeeLegal

> 'It was all about getting people out of the cars, and having fun on the bicycle in the city. And for people to feel it was possible to be a cyclist. And having fun! We had a lot of fun.' (Falzoni, personal communication, 2020)

It was hoped that if they would use the bike for leisure, they would be enticed to also use it as a mode of transport. However, as the rides were organized during the night, confrontations with traffic were rare, producing little public debate about cycling infrastructure. Still, the *Nightriders* group formed a success in planting seeds into other people's mind and following activist groups, as will be discussed in the section after the following.

## Organization and resource mobilization

The organizational level of the niche in the '80s was low, it remained limited to a few active cyclists coming together once a month. Falzoni recounts:

> 'I kept the group under 40. When I do the events, once a month, with t-shirts and kids and whatever. There were not more than 100.' (Falzoni, personal communication, 2020)

Still, she pushed for other groups to be formed, aiming to enlarge the community. Resources mobilization remained limited during the 80s, the amount of members of the community was low, and organizational level practically non-existent. No formal associations were formed or funds collected in any professional way. This initial phase is indeed characterized by non-committing relationships between individuals.

## Interaction with political structures and opportunities

Until the early '90s, cycling in Brazil was only conceived as a potential solution for its cities' heavy congestion. This changed with the United Nations Conference on the Environment and Development, which was held in 1992 in Rio de Janeiro. It brought the agenda for sustainable development to the heart of Brazil, and with it attention for cycling policies as a way to foster sustainability (Leite et al., 2018).

The next year, the Department of Open Space and Environment (DOSE) was installed in São Paulo and led by Werner Zulauf, a prominent environmentalist. Together with Brazilian engineer Gunther Bantel, who had witnessed the cycling transition in Amsterdam in the '70s, he started a working group to discuss cycling use in the city: the Cyclist Project (Lindenberg Lemos, 2020). Bantel, who had come from civil society to promote cycling policies from within the State, is an early example of 'institutional activism', creating what would become a 'network of infiltrators' that continued to transform urban

transport thought within the State bureaucracies long after Bantel left DOSE (Leite et al., 2018).

Also, Bantel contributed to the drafting of the new Brazilian Traffic Code (Federal Law n. 9.503/1997), which resulted four articles concerning cycling issues. 31 years after the creation of the national traffic codebook in 1966, novel legislation concerning cyclists was published in the new Brazilian Traffic Code (BTC) in 1997. The most important BTC article involved the formal recognition of the bicycle as a mode of transport (Leite et al., 2018). There was no formal role for civil society in developing the BTC, but through early 'institutional activism', cycling issues were implemented at the federal level of State.

Being relatively quiet until '98, activists, amongst others Falzoni, launched a campaign entitled "*Bicycle Brazil: Pedalling is a Right*", cycling 1500km from the coastal town Paraty to Brasília, to celebrate the adoption of the bicycle in the BTC whilst demanding implementation of cycling policies (Falzoni, personal communication, 22-01-2020). Following Lindenberg Lemos (2020), where civil society had previously primarily focussed its actions on other actors, organizing leisure night rides for middle-class citizens; they now redirected their attention to the State. It demonstrates the "duality of structure", as the regime rules are both a means as an outcome of action (Giddens, 1984). On the one hand, actors enact rules and initiate action that will produce new rules and realities. On the other hand, existing rules and realities configure actors, such as through (un)favourable arrangements, shared beliefs and lifestyles (Geels, 2011).

## 5.2. Second phase: Globalization vs. anarchist strategy ('00-'07)

While Brazilian politics was dominated by combatting hyperinflation during the 80s and 90s, industrialized Western countries introduced neoliberal policies to combat stagflation, including efforts to open up markets across the world. Globalization efforts were to be discussed in 1999 at the WTO summit in Seattle and G8 summit in Geneva in 2001, but were confronted with strong civilian resistance from anarchist movements. As during the 1960s in the Netherlands, the São Paulo cyclist community used the bicycle as a materiality to symbolize an anarchistic counterculture.

### Framing

Anti-globalist and anarchist thought was popular amongst the cycling community of São Paulo, recalls Thiago Benicchio, an important activist and later founder of the association CicloCidade (Benicchio, personal communication, 2020). In 2001, São Paulo cycling community organized the first *Bicicletada* in response to the G8 summit (see Figure 10). The *Bicicletada* was a Brazilian version of *Critical Mass*, which had its roots in San Francisco in

1992. Since the '90s, São Paulo cyclists used an email list to communicate, share ideas and organize collective bike rides in the city (Benicchio, personal communication, 2020).

The bicycle itself was primarily used as a democratic symbol, against the capitalist industrial policies dominated by automobile-interests. A symbol that portrayed a different vision of society:

> '(...) in a more general way, we were thinking about the resources that we have, the space, and how people behave in the street. Why are people so aggressive, yelling at the street, and why private space is bad and public space is good. So there were a lot of things to be connected to the question of car centric society. And the bicycle appeared to me as an artistic and potent tool to question that society.' (Benicchio, personal communication, 2020)

The *Bicicletadas* were, in line with the Critical Mass movement in San Francisco, 'organized coincidents': cyclists coming together to ride the city, providing a performative critique of the automobile society. Ideas of radical democratization of the city were popular, often drawn upon European or American progressive literature. The cyclist community also published their own material to disseminate alternative visions on the city. One publication of combined translated texts into Portuguese became particularly important: *Apocalypse Motorizado*. It included texts ranging from the Dutch Provo movement and the White Bike Plan, to a summary of Ivan Illich' famous book *Energy and Equity*.

Although consciously engaged, political ideas of the cyclist community remained at the meta-level and did not find surface. Above all, the *Bicicletadas* were about being creative and creating a community amongst fellow urban cyclists (Benicchio, personal communication, 2020). Attention was primarily directed towards car drivers: pamphlets, blogs, graffiti and hand painted cycling lanes were used to demand respect for cyclists.

## Organization and resource mobilization

The growth of the São Paulo cyclist community grew as transport conditions in the city worsened. The monthly rides that had started at Cyclist Square (a previously nameless square which had been baptized by the cyclist community as *Praça do Ciclista*, and formalized in 2007 by the city authorities) increased in size substantially. It reached a peak on September 22nd 2007 on World Car Free day, attracting approximately 700-1000 people (Falzoni; Benicchio, personal communication, 2020).

The community was fuelled by international exchanges of ideas and people, including the founder of *Critical Mass* San Francisco, Chris Carlsson, who came to Brazil and met prominent activists such as Benicchio and Falzoni. International conferences such as the World Carfree Network, and its popular Czech magazine *Car Busters* also helped shape the discourse and ideas for action in São Paulo (Benicchio, personal communication, 2020).

## Political structures and opportunities

During this period, there was little contact with private or public (niche) actors for two reasons. Firstly, it was inconceivable that the government would introduce cycling lanes; São Paulo had never known them in the city. Secondly and more importantly, until 2007 the urban cyclist community refused to engage in any official dialogue with formal actors. Because of the anarchist ideology borrowed from the *Critical Mass* movement, they denied all formal interviews and invitations from authorities or other institutions, because 'it was not a group, it was not a collective' (Benicchio, personal communication, 2020).

While the growing cycling community had traction and increased its visibility in the city, formal contact with government authorities remained absent. After years of non-communication, this changed, caused by the cycloactivists' perceived need for formal representation and communication, amplified by continuous attempts by city policy makers to dialogue. From 2007 onwards, many prominent members from the community formed a range of formal cyclist collectives and associations, starting a new phase of institutionalization and collaboration with other niche and regime actors.

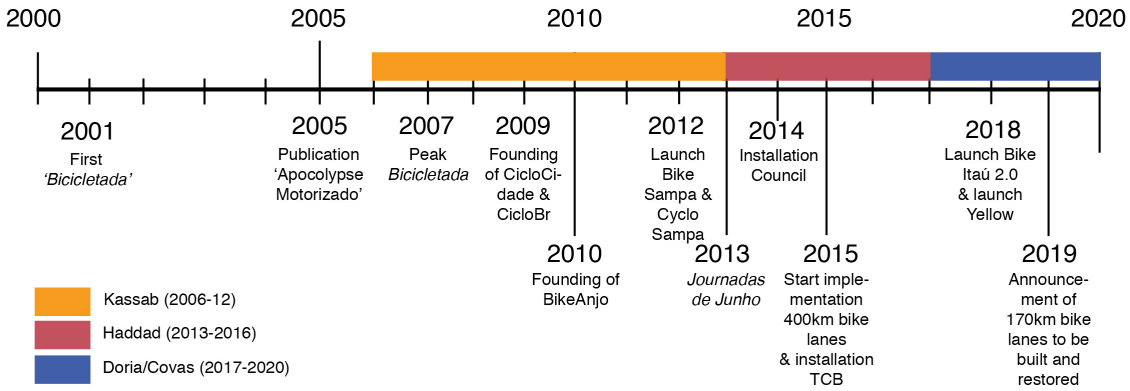



**Figure 10:** Timeline 2000-2020, niche events.

## 5.3. Third phase: Institutionalizing Power & Opening Up the Public Sphere (2007 – present)

The 3rd phase is structured along three subsequent city administrations (Kassab; Haddad; Doria/Covas). During this phase, private and institutional actors from civil society emerge at the niche level, resulting from the introduction of the public bike sharing systems. This section thereby further analyses the roles and interactions of the niche actors in promoting cycling policy, whilst discussing the change in PBSS policy.

### 5.3.1. The Kassab Administration (2006-2012): Cycling as a Leisure-Based Model

Two policies of mayor Kassab (DEM/PSD - Democrats/Social Democratic Party) are of importance here: the Clean City campaign and the introduction of operational bike lanes. The Clean City campaign (*Cidade Limpa*) entailed legislation forbidding public marketing outlets such as billboards, resulting in large corporations to seek new opportunities for public advertisement.

Secondly, the administration began implementing operational bike lanes (*ciclofaixas de lazer*) aiming at 'enlarging the amount of sportsmen/women in the city' (Lindenberg Lemos & Neto, 2014). Operational bike lanes are temporarily closed off roads for motorized traffic, especially during the weekends, and require signs, safety measures and traffic controllers. They bring high costs, an estimated USD$ 74,000 for initial costs and USD$ 8,700 per day of operation, but were covered by a private sector sponsor (idem).

#### Framing

Initially, co-founder and director of CicloCidade Aline Cavalcante accounts that initially the cycloactivist community was very critical about the operational cycling lanes: 'the bank is giving money to a temporal structure, which is very expensive, and could have been used to construct permanent [cycling] infrastructure.' (Cavalcante, personal communication, 2020). Indeed, also the perpetuated frame of *cycling as leisure* was confronted with critique. However, various respondents argued that the operational cycling lanes did have an important role in creating visibility of the bicycle in the urban sphere and allowed car drivers to be incentivized to use it for transport (Guth; Falzoni; Cavalcante, personal communication, 2020).

One of the first civil society organizations' successful actions in altering the frame was the institutional transferral of the city government's cycling department from the Secretary for Green and Environment to the Secretary of Transport (Cavalcante, personal communication, 2020). Although the BTC recognized the bicycle as a mode of transport since 1997, many local

governments still designed cycling policy based on a leisure model. The institutional transferral signified both a political and a symbolic change that recognized the bicycle as a mode of transport, which required associated infrastructure and policies as such.

## Organization and resource mobilization

Operational bike lanes were funded by commercial bank Bradesco through a yearly contract with the city government. When Bradesco quit funding the operation in August 2019, with no new sponsor found, the Municipality chose to stop the operational bike lanes (Folha de São Paulo, 2019), proving the fragility of the policy and demonstrates an unsatisfactory public-private partnership [9].

As a result of the Clean City campaign, public bike sharing systems became one of the only possibilities for street marketing. Adopting the advertisement model known in various European cities, Brazilian bank Itaú launched Bike Sampa in 2012 (Harkoth, personal communication, 2019). The docked bikes were funded by the bank, operated by a mobility service provider and regulated by the municipal government. The docked bikes were first restricted to one middle-class neighbourhood (Vila Mariana), but over the next five years spread to other neighbourhoods, although mainly located in middle-class areas in the city centre (Bardelli, personal communication, 2020). In 2013, the second PBSS, CicloSampa, was introduced in São Paulo under patronage of Bradesco, but did not gain as much importance as Bike Sampa. Today CicloSampa has 19 stations, located on strategic locations close to Bradesco offices and public transit stations.

In order to represent the cyclist community and influence policy-makers more effectively, the cyclist community formed a range of organizations and associations after the peak momentum of 2007. Between 2009 and 2010, three important cycloactivist organizations were founded: CicloCidade, CicloBr and BikeAnjo, using different tactics, but with the same goal of promoting cycling in the city. Where CicloCidade focussed on research, education and advocacy directed at the State, CicloBr focussed on operational bike lanes and policy, and BikeAnjo on educational programs [10]. In the following years, many more collectives would be founded, including regional bike associations for each region (i.e. *Bike Zona Sul*).

[9] Recently, technology platform company Uber has proposed to finance 117km of operational bike lanes possibly continuing the operation (Exame, 2020)

[10] See https://www.ciclocidade.org.br/, http://ciclobr.org.br/ and https://bikeanjo.org/

Benicchio reports how the formalization of the cycloactivist community into associations led to an approach by large private actors, primarily banks Itaú and Bradesco:

> They [Itaú] wanted to create a network of supporters for their shared-bike plan. They were basically sponsoring us, on our website with a logo. We [CicloCidade] got institutional financing. By that time we were the only cyclist organization who got that kind of grant. They did not want us to do any project, just gave money to exist. That was kind of an achievement, and gave us solidity. Some collectives of that time for example don't exist anymore, such as collective Cru. But because we were a formal organization, had a formal planning, did open planning sessions, they came to us (Benicchio, personal communication, 2020).

The Clean City campaign and the consequent search by private actors for public advertisement opportunities had important consequences for the cycling niche. Large banks were now sponsoring cycling operations in the city on at least three levels: operational bike lanes, public bike sharing systems and cycloactivist organizations. Newly founded cyclist associations and cyclist media outlets benefited greatly from the institutional or project finance from private actors, allowing them to further professionalize and use their resources to alter the mobility regime.

## Political structures and opportunities

Again, the successful transfer of the cycling department not only changed the frame of cycling, but also was an important step in transforming the political structures that perpetuated cycling as a leisure model. The Secretary of Mobility and Transport now considered cycling policy as part of the complete transport policy framework and was to be taken account in new infrastructural developments.

Flavio Soares, journalist and active member of CicloCidade, notes that when political opportunities occurred, the cycloactivist community became increasingly organized. In response to grave events such as a cyclist death, they organized street protests, remembrance rides and installed white painted 'ghost bikes' at the site of the tragedy. Soares argues cycloactivist organizations became increasingly effective in capitalizing political opportunities into demands for extended cycling policies (Soares, personal communication, 2020).

### 5.3.2. The Haddad Administration (2013-2016): Introducing Cycling as Transport

Cycling policy entered a new phase with the arrival of mayor Fernando Haddad (PT - Workers Party). By implementing large amounts of cycling infrastructure, and creating institutional spaces to facilitate public participation for transport planning, Haddad's administration meant a significant turn in the mobility regime.

When mayor Haddad, together with the São Paulo state government, announced a bus fare rise in early 2013, he instigated massive protests, which would become known as the June Journeys (*Jornadas de Junho*). Building on public disenchantment over the commodification of the cities amongst the worker's class around the country, social movements such as the *Free Pass Movement* mobilized hundreds of thousands of citizens, with some of the biggest protests in São Paulo. This urban movement in which people claimed transportation reforms, merged with other issues such as education, health and public participation should indeed be seen in light of the 'right to the city' (Friendly, 2017). Civil society actors show to play a crucial role in claiming their right to the city during this period, in the form of participation, facilitated by newly installed institutional spaces during the tenure of Haddad.

#### Framing

The centre-left city government meant a favourable political period for the niche actors, as the city government had adopted cycling as an important mode of transport in the party's mobility campaign plan. Cycloactivist Bardelli states that the discourse change and the administration's favourable position on participatory politics opened the way for more collaboration between niche actors and the government (Bardelli, personal communication, 2020).

The frame of cycling as a sustainable mode of transport was reiterated before the city 2013 mayor elections. CicloCidade presented the candidate-mayors a 'Letter of Commitment', which included cycling policy commitments for the mayor's first six month Plan of Goals, which all but one of the candidates signed (Cavalcante, personal communication, 2020). Keeping his word, Haddad launched 'Ciclovia SP400': a comprehensive cycling program that included the construction of 400km of cycling lanes. After the completion in 2015, the cycling network in São Paulo had jumped from 63km to 468km (Municipality of São Paulo, n.d.).

#### Organization and resource mobilization

Besides the renowned CicloCidade and CicloBr, more cycloactivist associations were formed during the Haddad administration, expanding the amount of

actors in the niche. These included regional bike associations, such as BikeZonaSul, BikeZonaOeste, BikeZonaLeste and BikeZonaNorte. Lucian Bernardi, urbanist and member of BikeZonaSul, tells that through government advocacy, research and public events, these associations aim to promote cycling in their regional area of the city. Although they are founded autonomously, the following statement illustrates a strong level of collaboration between the actors:

> 'Yes, we talk a lot about exchanging experiences, what has been a success, what not. When it comes to making demands from the city hall, we are always talking together; sharing news about government plans, et cetera. It is a horizontal system; most often there are people coming together from all sorts of organizations, including curious participants.' (Bernardi, personal communication, 2020)

Civil society played a crucial role during the introduction, design and implementation phase of the 400km cycling plan. This is confirmed by a large majority of respondents, including state actors. Ciro Biderman, director of city bus company SPTrans during the Haddad tenure, emphasizes the importance cycloactivist organizations during the implementation of the cycling program:

> 'They make a big fuss, have a lot of space in the media. And so if someone would be protesting against the [cycling] lanes, then they would protest in favour of the lanes. They are serious activists, really important. It's very important for a politician to have positive news in the media, and they were giving that. This was super important.' (Biderman, personal communication, 2020)

## Political structures and opportunities

Interestingly, the 2013 June Journeys formed a political opportunity for mayor Haddad to overthrow conventional transport policy and install new institutional structures formalizing public participation, as recalled by city government urban planner at TEC Suzana Nogueira (Nogueira, personal communication, 2020).

After the 2013 June Journeys, Nogueira was invited to design and implement the cycling infrastructure plan. Extensive cycling infrastructure plans had already been designed by the TEC, once in the '80s, once in the '90s, and combined into one study in the early '00s by Nogueira, but never fully executed (Nogueira, personal communication, 2020). During the time of planning and installation, there were cross-departmental discussions, including with regional transport managers (idem), thus overcoming the often-quoted 'institutional fragmentation' that caused problems for transport policy

(Marques, 2018). In every meeting, cyclists and representatives from cyclist organizations were invited to participate, anticipating a vision within TEC 'that until now we did not have' (Nogueira, personal communication, 2020).

The development of the broader municipal mobility plan, PlanMob2015 set the stage for the strong disputes between various road-based transport coalitions (collective transportation groups, cycloactivist groups, etc.) and resulted in the creation of institutional spaces for public participation (Cavalcante; Guth, personal communication, 2020). In 2014 the *Municipal Council for Transport and Traffic* (Council) was inaugurated, a deliberative space in line with Brazil's recent but significant legacy of participatory politics (Avritzer, 2002).

In 2015, transport-mode specific Thematic Chambers were installed, as a result of the large amount of political and technical issues. *The Thematic Chamber for the Bicycle* (TCB) became the deliberative space for the two most important cyclist organizations, CicloCidade and CicloBr, to discuss cyclist policies and provide technical assistance to the Municipality (Soares, personal communication, 2020). The Haddad administration proved a favourable political climate for participatory politics, with representatives of cycloactivist organizations describing the deliberative spaces at the time as extremely fruitful (Cavalcante; Harkoth, personal communication, 2020).

Expectations that the large scale implementation of cycling infrastructure would lead to significant shift from motorized transport to cycling were lowered when the 2017 Origin-Destination research (two years after the completion of the 400km) showed a 0,1 percent point increase in cycling only, from 0,8% in 2007 to 0,9% in 2017 (See Table 7). However, more recent data shows positive signs of stronger increases in bicycle use. Data from digital counters in business area Faria Lima have noted an 85% increase in monthly cyclists in two years, from 76.172 in 2016 to 167.435 in 2018 (Rabello, 2019).

The data also shows that there has been an almost threefold increase in trips by bicycle by the top-income tier, from 4,000 trips in 2007 to 15,000 in 2017. The highest increase in absolute numbers however came from income range 2 (from 129,000 in 2007 to 162,000 in 2017). It further shows that people from lower income levels are more dependent on public transport and non-motorized mobility modes (mainly bus and walking).

**Table 7:** Trips by household income – 2007-2017 in SPMR. Source: Metro (2019). Author's own elaboration.

| 2007 | TRIPS BY HOUSEHOLD INCOME | | | | | (in thousands) | |
|---|---|---|---|---|---|---|---|
| MODE | Range 1*** | Range 2*** | Range 3*** | Range 4*** | Range 5*** | TOTAL | % |
| METRO | 309 | 718 | 800 | 240 | 156 | 2.223 | 5,8 % |
| TRAIN | 195 | 333 | 217 | 32 | 38 | 815 | 2,1 % |
| BUS* | 2.299 | 4.296 | 3.353 | 616 | 311 | 10.875 | 28,5% |
| CAR** | 796 | 2.139 | 3.749 | 1.818 | 1.970 | 10.472 | 27,5% |
| MOTOR | 110 | 294 | 235 | 62 | 20 | 721 | 1,9% |
| BICYCLE | 101 | 129 | 56 | 14 | 4 | 304 | 0,8% |
| WALKING | 3.806 | 4.945 | 2.946 | 567 | 359 | 12.623 | 33,1% |
| OTHER | 11 | 17 | 23 | 6 | 4 | 61 | 0,2% |
| TOTAL | 7.627 | 12.871 | 11.379 | 3.355 | 2.862 | 38.094 | |

| 2017 | TRIPS BY HOUSEHOLD INCOME | | | | | (in thousands) | |
|---|---|---|---|---|---|---|---|
| MODE | Range 1*** | Range 2*** | Range 3*** | Range 4*** | Range 5*** | TOTAL | % |
| METRO | 428 | 1.496 | 1.084 | 227 | 165 | 3.400 | 8,1% |
| TRAIN | 241 | 644 | 300 | 43 | 17 | 1.245 | 3,0% |
| BUS* | 2148 | 5.443 | 2.520 | 374 | 165 | 10.650 | 25,5% |
| CAR** | 923 | 3.997 | 4.560 | 1.285 | 1.044 | 11.809 | 28,1% |
| MOTOR | 113 | 521 | 356 | 41 | 33 | 1.064 | 2,5% |
| BICYCLE | 101 | 162 | 73 | 26 | 15 | 377 | 0,9% |
| WALKING | 3.407 | 6.365 | 2.764 | 474 | 340 | 13.350 | 31,8% |
| OTHER | 24 | 51 | 27 | 3 | 7 | 112 | 0,3% |
| TOTAL | 7.385 | 18.679 | 11.684 | 2.473 | 1.786 | 42.007 | |

*includes schoolbus and shuttlebus

**includes taxi rides (which compose less than 0,3% of total voyages)

*** Monthly income, Range 1: from 0 to 1.908 real; Range 2: from 1.908 to 3.816 real; Range 3: from 3.816 to 7.632 real; Range 4: from 7.632 to 11.448 real; Range 5: more than 11.448 real (in 2017).

## Public-Bike Sharing Systems under Haddad

Bike Sampa, the PBSS launched during the Kassab administration, received significant attention from the Haddad administration in the form of regulation and targets. Until 2015, the PBSS covered 10% of the city (Secretary of Transport, 2015), contained 259 stations, with 70.444 users registered and an average of 1792 trips per day (ITDP, 2017: 17). PlanMob2015 issued various directives concerning PBSS, amongst others: to expand the coverage of the system to all regions of the city; integrate the system with public transit

stations; and integrate with the public transport card to facilitate intermodality. The territorial expansion targets included: 20% of city territory in 2016, 60% in 2024 and 100% in 2028 (Secretary of Transport, 2015: 111).

However, although highly supported by PBSS operators and civil society organizations, the regulation proved to be weak, and was not moulded into enforceable legislation. As will be discussed in the following section, the next administration deregulated the PBSS, changed provision model, and left expansion targets for territorial coverage out.

### 5.3.3. The Doria/Covas Administration (2017-2020): Consolidation of Cycling Policy

The political climate in Brazil transformed into a strong anti-Workers party sentiment, which too was an unexpected corollary of the 2013 June Journeys protests (Friendly, 2017). During the city mayor election of 2017, incumbent mayor Haddad lost to João Doria (PSDB – Brazilian Social Democracy Party). Doria had primarily designed his campaign around dismounting many of the PT mobility policies of the last years under the slogan 'Accelerate São Paulo' (De Oliveira, 2016) meaning an unfavourable political environment for the cycling niche.

In the first week after his inauguration, Doria announced speed increases on the ring roads and the possible removal of cycling lanes. As a response, the cyclist community organized a protest in front of the new Secretary of Transport and Mobility Sérgio Avelleda (Avelleda, personal communication, 2020). Avelleda, a former president of the Train Company (CPTM) and pro-cyclist politician, organized a series of neighbourhood discussions to facilitate a dialogue and explain the importance of cycling lanes. Pressure to remove cycling lanes came from three groups primarily: small business owners, residents and city counsellors. Doria too exerted pressure in the beginning to remove cycling lanes, but respected Avelleda's expertise (idem). Although speed limits were increased for some roads, none of the cycling infrastructure was eventually removed, mainly also, as a result of the continuous pressure of civil society actors:

> They [cycloactivist organizations] are responsible for the protection of the cycling lane infrastructure. (…). I remember we had a monthly meeting with the *Conselho* [Council]: we had different sectors, different visions, from civil society, bus operators, business men, neighbours, and the synthesis we found each meeting was great. I can say you, without the civil society's organizations' pressure, cycling lanes would have been removed (Avelleda, personal communication, 2020).

## Framing

Over the years, civil society actors had not only learned to use various media outlets to build public support, but had also become cunning in shaping the narrative. As cycling policies were highly politicized, civil society organizations started to increasingly focus on using 'road safety' as the primary frame that ought to be the focus of the municipal government's mobility policy (Soares, personal communication, 2020). An actor that played a key role in co-shaping the narrative change was Bloomberg Philanthropies. Its international program *Bloomberg Initiative for Global Road Safety* (BIGRS) seeks to aid low- and middle- income countries to increase road safety. They invited new Secretary of Transport and Mobility Octaviano to come to New York City to discuss the issue of road safety and cycling policy recommendations. According to Soares, this made cycling policies:

> 'a "road safety" issue, not for the often called "communists" or "cycloactivists" but for everyone' (Soares, personal communication, 2020).

A few weeks later, in 2018, plan 'Vision Zero' was announced, which aims to reduce traffic accidents. It is based on the premise that no premature death is acceptable, maintaining human life as priority, overriding the efficiency of mobility and any other objectives of the road and transportation systems (Secretariat of Mobility and Transport, 2018).

## Organization and resource mobilization

In terms of organization and resource mobilization, the new actor Bloomberg Philanthropies played an important role in three ways. First, in acting as a mediator by hosting a series of deliberative workshops between the cycloactivist organizations, private actors and the State. Second, by using its resources to organize field visits to influence state actors. Third, by depoliticizing the debate in framing cycling policy as a "neutral" road safety issue.

Soares argues there is strong collaborative capacity between the actors within the niche (Soares, personal communication, 2020). Although the Doria tenure was initially perceived as a highly unfavourable political climate for the cycling niche, the collaborative efforts of a diverse set of actors succeeded in the extension of cycling infrastructure. More concretely, it resulted in the city government's recent announcement of a 173km cycling infrastructure extension plan to be built before the end of 2020, which would bring the cycling network to a total of 676km (Globo, 2019). Figure 11 shows the evolvement of cycling infrastructure implementation during the past three city governments.

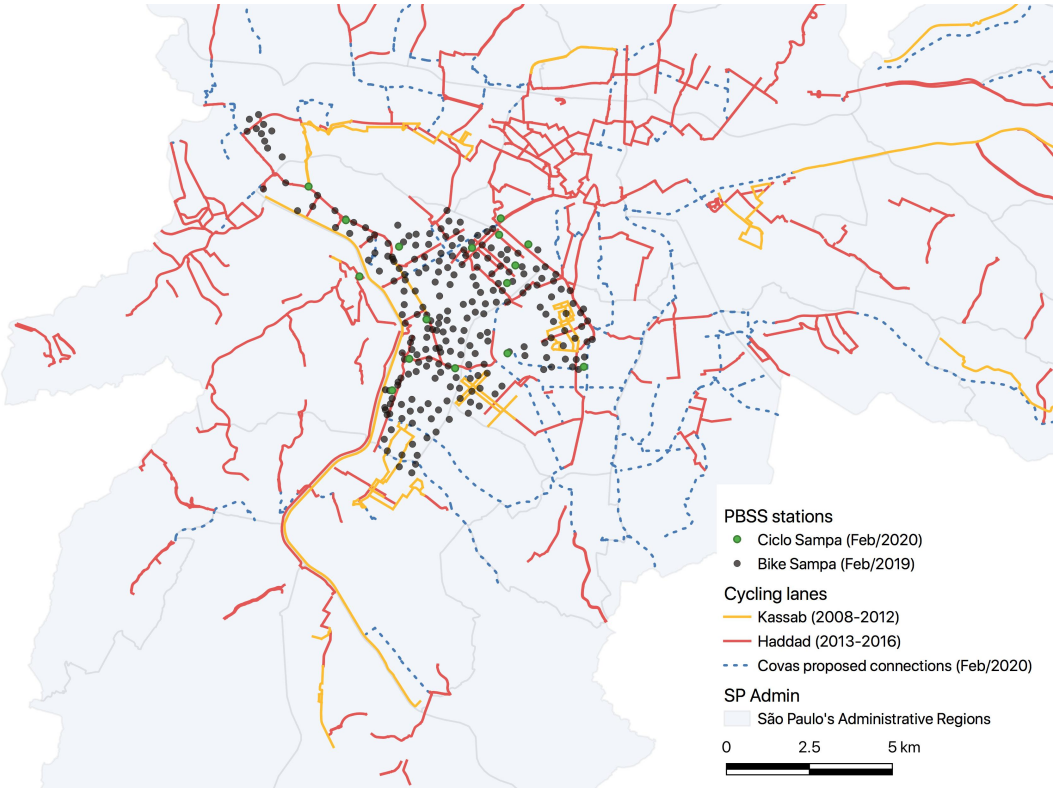



**Figure 11:** Evolution of cycling lane construction 2008-2020. **Source**: Website GeoSampa (2020); TEC (2020). Author's own elaboration.

Still, collaboration between PBSS operators and cycloactivist organization is nuanced. Renata Rabello, Urban Planning Manager at operator Tembici recalls that cycloactivist organizations at times join field research studying the optimal bike station locations. Also, data and plans have been shared amongst the niche actors, reiterating the "good relationship" between the actors (Rabello, 2020). Yellow, which operates *dockless* bikes and scooters, has been less enthusiastic about the cycloactivist organizations, as one employee stresses why they don't work together on a frequent basis: 'cycloactivists are very complicated people. I mean, not all of them, there are exceptions, but I think they are very radical.' (Employee Grow, personal communication, 2020). The polemic attitude is mirrored by cycloactivists, looking at this illustrative quote by current director of CicloCidade Jô Perreira:

> 'One of the things I told them is that they are enforcers, they don't ask people, they don't inform people and they impose it on people. After they put the bikes in the city, the bikes started to disappear, and there were other problems. They took them away again and said, "If you take the bike and take it to that point that you can't, you'll pay a fine", so first you invade, you riot, and then you punish? It's all wrong.' (Perreira, personal communication, 2020)

The dual world vision is echoed by Glaucia Pereira, a sustainable mobility consultant, who argues the "uberization of mobility" has produced two focal groups: the "smart city" group, represented by 'the car industry, shared economy enterprises, and fin-tech startups', and the 'sustainable city' group, represented by 'activist groups and NGOs' (Pereira, personal communication, 2020).

## Political structures and opportunities

The maturation of the cycloactivist organizations strategies and organization have, with the important support of other niche actors such as PBSS operator Tembici, financial supporter Itaú, and philanthropic organization and think-tank Bloomberg, developed into an *epistemic community*: a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area.' (Haas: 1992: 16) (See Table 8). Indeed, by providing technical assistance to the city government they are capable of 'framing the issues for collective debate, proposing specific policies and identifying salient points for negotiation' (Haas, 1992: 2). The participatory spaces created during the tenure of Haddad have proven to be an important channel through which civil society organizations can operate. However, although the deliberative chambers have proven to be fruitful, current members of the Council have expressed their concerns due to 'internal disputes' and consequent 'loss of legitimacy' (Bardelli, 2020).

Problems with participatory spaces have earlier been discussed in the case of urban planning (Friendly & Stiphany, 2019; Siqueira, 2019). They show the precariousness of the spaces; just the installation does not guarantee success. Nevertheless, former Secretary of Transport and Mobility Avelleda (2020) argues that cycling policy has become "consolidated" within the urban mobility policy regime. Albeit with caution, the recent cycling infrastructure plan, announced in a previously alleged unfavourable political climate, does confirm that statement.

**Table 8:** Analytical overview of the changing phases of the cycling niche.

| | 1st: '80s-'90s | 2nd: '00s | 3rd: '07-present |
|---|---|---|---|
| **Frames** | Leisure, fun<br><br>Focus: car drivers | Anti-globalist; anti-capitalist; sustainability; respect cyclists<br><br>Focus: car drivers | Road safety; sustainability<br><br>Focus: policy makers |
| **Organization** | Loose groups; small community | Urban cyclist community (anarchist organizational structure) | Epistemic community: collaboration between heterogeneous set of actors; |
| **Resource mobilization** | Low | Low/Medium | Medium/High |
| **Political Structures and opportunities** | Little capacity to capitalize political opportunities | Little capacity to capitalize political opportunities: agenda-setting | Effective policy influencing capacity |

## Public Bike Sharing Systems under Doria/Covas

On August 2nd 2017, Brazilian start-up Yellow placed 500 dockless bikes throughout the city, without territorial restrictions. The bikes ended up 30km from the city centre (Bardelli, personal communication, 2019). A Yellow employee explains that the relatively low use in peripheral areas became a too costly operation for Yellow to maintain (Yellow employee, personal communication, 2020). Therefore, a month later Yellow restricted the bike-placement area to the more wealthy areas (central southern and western areas) of town. Over the past two years, the amount of bikes grew into the thousands, but due to a recent "structural restoration" and financial problems of the mother company Grow, all bikes have been taken off the streets in early 2020 (Globo, 22-01-2020).

Bike Sampa too only operates in more wealthy areas of town. Tembici manager Renata Rabello explains that sponsor Itaú did not want to put in more investments to expand to peripheral areas and that financial support from the Municipality remains absent (Rabello, personal communication, 2020).

Chief policy coordinator at the Secretary for Mobility and Transport Andre Castro holds that new regulation was developed in response to the arrival of Yellow, regulating both *docked* and *dockless* public bike sharing systems (Castro, personal communication, 2020). Decree No. 57.889 of December 21st 2017 introduced an accreditation system, which allows every new

private mobility company to offer public bike sharing services, under certain conditions. The accreditation policy requires every new company to register with the government and pay a fee for the use of public space.

Here too, some guidelines have been outlined, of which the following are of importance (57.899, Art 2): (III) the expansion with an objective of equilibrated operation, attending all regions in the city, (VI) the stimulation of the interoperationability of PBSS services offered in the municipality, in order to not segregate different networks of operation (Secretary of Mobility and Transport, 2017). As guidelines, both the decree and corresponding resolution offer little enforceable legislation to control (i) co-determination of station localization, (ii) territorial expansion throughout the city, or (iii) price integration with public transit in order to facilitate attractive intermodality options. This is confirmed by Tembici manager Rabello, who states that Tembici is in principal in control to decide station locations, pricing and number of vehicles (Rabello, personal communication, 2020). Referring back to the provision models by deMaio (2009), the decree reflects a pro-profit accreditation model. Moreover, as PBSS are regulated by the same municipal regulator (Accredited Transport Technology Operator) as private ride hailing services (i.e. Uber), the decree reveals that PBSS are seen as a private service, not as a public policy.

Most of the respondents from cycloactivist argue the current model has 'positive effects for cycling' in general, but faces issues of inclusiveness due to the restricted use areas and lack of public transport fare integration. Again, private parties fulfilling public functions has many merits, such as allowing the Municipality to invest in other necessary public services, but also creates potential adverse dependencies. Suzana Nogueira illustrates this political economic dynamic for this case study with three examples: operational bike lanes (Bradesco), bicycle parking near Paulista Avenue (Itaú) and public bike sharing services (Yellow). All three were funded or operated by private parties, but were withdrawn on a short-term notice (Nogueira, personal communication, 2020). No alternative patrons were found and the Municipality refused to step in, leaving little continuity in cycling policy advancement in the city.

Regulation of PBSS its provision models differs per city. Fortaleza is seen as an example of for successful PBSS policy amongst city planners, due to its high usage and high level of inclusiveness (Nogueira, personal communication, 2020). Bianca Macêdo, PBSS policy coordinator for the Fortaleza city government explains this is due to:

> '(…) close management of the system from the government: where the stations are located; pricing; quantity and more. We decide where the

> stations are, just like other public transportation systems.' (Macêdo, personal communication, 2020)

Fortaleza retains a public bidding model in opposition to an accreditation model: the PBSS operator is a for-profit company, but is held under strict regulations and involvement of the city government. Indeed, the PBSS is treated as 'any other public transport system': one can use the bike for free up to one hour with one's public transport card (Macêdo, personal communication, 2020). The public bidding model entails a financial investment of the city government, but has resulted in the first city in Brazil to have successfully constructed public bike share systems in peripheral areas.

# 6. Results: Drivers and Barriers

This chapter provides a synthesis of the most important drivers and barriers that currently affect the transition towards more PBSS use, based on the previous results chapters and all semi-structured interviews with PBSS operator representatives, cycloactivists from civil society, and policymakers from the municipality of São Paulo. It uses the analytical levels put forward by the Multi-Level Perspective (Landscape, Regime, Niche) to distinguish the drivers and barriers (see Table 6). Many of the drivers and barriers identified at the landscape level are of structural nature and have important effects of the stability of the mobility regime. They include deep-seated values, policy traditions and urban structures that have developed over time, as discussed in historiographical analysis (see chapter 4). The list does not aim to be conclusive, many secondary drivers and barriers exist[11]. However, this chapter aims to provide a comprehensive overview of the most important drivers and barriers identified during the data analysis.

## 6.1. Landscape

The first results chapter showed the how urban development and political economic forces during the 20th century made São Paulo into a huge metropolis of an approximate width of 60km from border to border. Still, many of its main employment opportunities are concentrated in several districts located in the heart of the city. This urban sprawl and consequent large commuting distances form a significant barrier for door-to-door bicycle use. Moreover, the PBSS are currently limited to a few central regions of the city only. Bike Sampa is integrated with the public transport card (*Bilhete Único*), but does not include an intermodality discount, which other modes of transport (bus and metro) do have, making it a less attractive travel mode.

The geography of São Paulo is a second often-noted barrier. São Paulo is a hilly area, with altitude differences at some places more than 100m. The city central business district (Paulista) is located on a high ridge, resulting in many workers to opt for motorized transport modes when going to work. The geographical barrier also influences the stigma of cyclists as 'male', 'athletes', 'sports people', and discourages many people who do not recognize themselves in any of the categories. The stigma of the bicycle as a poor man's mode of transport also remains an important preconception. Guth & Soares (2019) add that in many Brazilians cities, many young men therefore change their bicycle for a motorbike when the opportunity arises.

[11] For example, the lack of showers in offices restrains some workers from not using the bike to work.

Global or societal issues such as 'sustainability' are of less importance for respondents. Important drivers that push the transition are primarily local drivers, such as road safety, but also air pollution and congestion. Various respondents note that sustainability is being described as an issue that has been driving policy orientations and personal motivations, but is less strong embedded than localized drivers.

Important have been other "best practice" global cities (Montero, 2017). Niche actors such as the cycloactivist organizations drew upon example cities such as Copenhagen, Amsterdam and San Francisco. Best practice cities have also played key roles for subsequent city administrations, adopting cycling policies from city visits to various European cities, as well as New York and Buenos Aires.

One respondent noted the "Brazilian fascination for technology" as an important driver for PBSS use. PBSS and privately owned bicycles are not one and the same thing. The "Uberization of mobility": the use of mobility services in combination with technological applications have made cycling more appealing to certain groups, particularly the middle classes. The digitalization of the bicycle has the possibility of taking away the stigma of the bicycle as a worker man's vehicle.

Lastly, the gap between men and women cycling in São Paulo is big. Roughly 10% of urban cyclists are female (Malatesta, 2014). It is a consequence of a combination of reasons, with the primary ones being: traditional values sustaining gender roles, sexist socio-cultural dynamics, and perceived of lack of public safety (Maria de Jesus, personal communication, 2020). During childhood, girls are taught not to occupy the streets. Boys play, girls stay ("*meninos brincam, meninas ficam*") and "get off the street" ("*saia da rua*") are common expressions that dominate the discourse during early years of upbringing (idem). Due to "intense male chauvinism" ("*machismo*") cycling is also perceived more as a transport mode for men (Lindenberg Lemos, 2020). When a woman does overcome the first hurdle of stepping onto the bike, she is often faced with prejudice and possible harassment (Maria de Jesus, personal communication, 2020). Traditional gender roles still dominate in Brazilian society, with many women fulfilling reproductive work – often besides other (informal) work, whilst men occupying formal jobs in town. The chain of activities that a woman needs to carry out (getting kids from school, doing groceries), in an increasingly extended centralized city, makes the bicycle an unattractive mode of transport (idem).

## 6.2. Regime

As widely described in the literature, Brazil has a strong legacy clientelism and the private sector influencing urban politics (Marques, 2018). The military

dictatorship period oversaw the installation of important mobility agencies, such as the Metro Company, TEC, and the Paulista Metropolitan Planning Company, while contracting private enterprises for the operation of public services (idem: 37). From 2012 onwards, the municipal government opted for a privatized PBSS model, with many auxiliary infrastructure and services such as the installation of bicycle stations and operational bike lanes to be funded and operated by market parties, creating adverse dependencies and short-term interests.

Many respondents describe the importance of favourable political administrations versus unwilling, or uninterested administrations. This has especially grown since the Haddad administration and increased polarization of cycling infrastructure policy. As we have seen, the pendular swing of politics has had strong implications direction of the mobility regime, looking at the receptiveness to input from niche actors and cycling policy enactment.

**Table 9:** Summary of drivers and barriers affecting PBSS use in São Paulo

| Levels of the MLP | Drivers and barriers |
|---|---|
| **Landscape** | • Local drivers such as road safety, congestion and air pollution<br>• Global "best practice" cities are important drivers<br>• Car and motor ownership remain important status symbols<br>• Geography: hilly landscape impede bike use<br>• Urban fabric: concentrated employment opportunities in the city centre and urban sprawl fostered large spatial distances<br>• Stigma of cyclists as athletes or poor people<br>• Uberization: the fascination for technology in Brazil attracts people to use PBSS<br>• Traditional values and gender roles impede women to cycle |
| **Regime** | • PBSS highly dependent on private sector<br>• Importance of the mayor's political view<br>• Strong Brazilian car industry<br>• Institutional fragmentation<br>• Lack of long term cycling policy vision |
| **Niche** | • Influential cycloactivist community; epistemic community<br>• Strong collaboration, tight communication channels<br>• Strong use of media outlets by cycloactivist organizations<br>• Presence of PBSS in city creates cycling imaginary<br>• Road safety and public safety perceived as strong barriers<br>• Too little and often unconnected cycling infrastructure |

Since the modernization policies and attraction of American car producers by Kubitschek in the '50s, Brazil has developed an enormous car industry, particularly in the southern Metropolitan Region of São Paulo. Lindenberg Lemos (2020) suggests countries that had little or no car industry, like Denmark and the Netherlands were able to transition to more bike use

faster, then the United States and Brazil, due to their economic dependence on the car industry. Although not statistically falsified here, respondents have argued the influence of the car industry is still significant for the stability of car-centred mobility regime.

Still, even in political climates favourable to cycling policies, institutional fragmentation remains a hurdle to effective policy development and implementation. Vertically, with the São Paulo state government operates the metro and train systems, while the city government operates the bus lines and cycling lanes. The process is further frustrated by horizontal fragmentation, as different departments and secretaries dealing with transport policy often do not work together effectively.

The combination of institutional fragmentation, periodical varying political positions on cycling and the dependency of market parties to finance cycling infrastructure and PBSS operations results in a lack of continuity. At times, long-term policy goals have been formulated in decrees, but are easily overturned during subsequent administrations. Long-term legislation such as PlanMob2015 and the Strategic Master Plan that entailed various active mobility goals up to 2028 have more legal significance, but have been amended, neglected or watered down.

## 6.3. Niche

It should be clear by now that the continuous advocacy efforts of civil society actors, with the support of other niche actors, have had significant implications in transforming the regime. Although the effects on the amount of cyclists are still modest according to the latest reports, the mobility regime has altered over time as the cyclist movement matured.

The very effective use of the media by cycloactivist organizations, with various cycloactivists maintaining their own video portals[12] and blogs with combined over hundreds and thousands of followers demonstrate the ability to create public support for cycling issues and mobilize resources (people and finance) when an opportunity emerges. Again, the role of private actors proved important in financially supporting cycloactivist organizations.

Infrastructural entities instigate novel imaginaries, producing new social realities. One can be aware of the concept of the bike, even have one at home, but its application conceived as impossible, until a new imaginary has been constructed. The dissemination of the colourful and accessible bikes throughout the city, in combination with the abrupt construction of extensive

[12] See for example https://www.facebook.com/VaDeBike/ (190,000 likes), https://www.youtube.com/user/BikeeLegal (170,0000 subscribers).

cycling infrastructure, creates this imaginary; promoting the idea that cycling in the São Paulo is possible. Empirical data from other cities around the world cited earlier support the argument that the existence of PBSS attracts new cyclists.

However, one of the most important barriers for people not using the bicycle is the strong perception of a lack of road safety. Traffic in the city still is described as dangerous, with car drivers not respecting cyclists, often cutting off cyclists or not giving way. Many people, especially women, fear to use the bicycle both for reasons of road safety, as because of a lack of public safety.

The lack of perceived road safety is strongly correlated to the lack of cycling infrastructure, both in quantitative as in qualitative terms. At the end of the 2020, a total amount of 676km cycling infrastructure will be present in the city. That still is a fraction of the total amount of 17,000km road network. Some strategic points are also lacking appropriate infrastructure; as the central part of the city is fringed by three main rivers (*Tietê, Pinheiros, Tamanduateí*), which are flanked with ring roads. The only way to enter the city's central parts is by crossing bridges developed for cars, with the majority of them lacking cycling lanes. The lack of infrastructure creates exclusion mechanisms for the many people living beyond the city's rivers. Lastly, when Haddad constructed the 400km within two years, there have been some design mistakes, most importantly in terms of unconnected bike lanes, creating at times confusing and dangerous traffic situations for cyclists.

# 7. Discussion

The three results chapters show the high level of complexity of studying mobility from a transition perspective. Contrary to what transition theory suggests, the findings of this case study show that public authorities have for a long time resisted clean and inclusive mobility policies. Only after the emergence of an increasingly effective niche comprised of different actors, the municipality of São Paulo has slowly been implementing clean mobility policies. Still, as described in the last section, many barriers persist. In what follows, the main findings will be discussed and compared to the literature. Thereafter, limitations will be discussed. The discussion ends with several practical recommendations for civil society and business and recommendations for policy.

## 7.1. Sustainable Mobility: Roles of Civil Society, Business and the State

Most studies using the Multi-Level Perspective focus on the development and dissemination of *new* technologies within (industrialized) societies. In promoting more bike use as a sustainable mobility solution, this study focussed on a *reversed* transition, where people ought leave their cars and opt for the bicycle. This particular sustainability transition is thereby strongly affected by deep-seated socio-cultural beliefs and values. This implicates the need for normative change and reiterates the need for civil society actors in mobilizing necessary public support when diffusing sustainability innovations.

In technological transitions, commercial actors are described as the driving forces pushing the transition (Geels, 2010). In sustainability transitions this picture gets more nuanced. Literature suggests that due to the normative nature and the collective goal of sustainability transitions, public authorities and civil society are crucial drivers of change (Vergragt & Brown, 2007). However, the findings of this research do not support the notion that public authorities form the drivers of change. Instead, this case study shows how primarily civil society actors play an indispensible role in promoting the transition for two reasons. First, they collaborate with private actors to optimize their commercial operations by providing community considerations, local expert knowledge and public support. Second, they show the ability to successfully pressure city government authorities to implement clean and inclusive mobility policies. In relation to the state, civil society and private actors thereby function as an *epistemic community*, effectively changing the narrative about mobility policy (Haas, 1992).

The findings thereby confirm research done by Slingerland and Schut (2014) and Wakeford (2012), ascribing civil society actors as 'agents of change'

for sustainability transitions. More specifically, the results affirm that citizen participation can 'reinforce the role of self-organizing civil society organizations in introducing innovation into existing systems' (Sagaris, 2014: 74). Also, the role of international donors is often downplayed in transition literature (Wieczorek, 2018). In this case, the results showed how the international donor Bloomberg Philanthropies has been important in many ways. It not only acted as a mediator between niche and regime actors, but also as a financial sponsor, and helped change the policy discourse.

Private actors operating at the niche level continue to play important roles: financially supporting cycling operations and organizations and operating PBSS itself. Findings show that these private actors are subject to a complex and fast changing relationship with the State as a result of policy, market and technology changes. Findings have brought forward various illustrative examples of unsuccessful public-private arrangements. It thereby confirms the notion that if these relationships are not well managed, they are likely to produce undesirable situations (Pinz et al., 2018).

Indeed, the results affirm 'policy as a cornerstone' for sustainability transitions (Li et al., 2016) and this study therefore concurs with the 'indispensability of politics' for transitions (Gopakumar, 2010). As policy makers recently opted for a minimally regulated accreditation model of PBSS, decreasing public control, questions of inclusiveness and sustainability arise. Indeed, this means that sustainable mobility inherently is a political enterprise, which cannot be deduced to a technological operation (Gopakumar, 2010).

## 7.2. The MLP in Developing Countries

The question of justice has recently gained attention in literature on sustainability transitions (Smith et al., 2014). Especially in the Global South, high socio-economic inequality demands extra attention for questions about access to new technologies. It is probable that a transition led by efficiency principles, 'smart cities' or transitions to low-carbon economies might perpetuate existing inequalities, leading to an 'unjust transition' (Swilling and Annecke, 2012). The first part of the results section show how cycling was purposefully discouraged, whilst favouring car policies and associated urban land use policies. The results thereby confirm the argument that transition trajectories in the Global South are often hindered by past practices of injustice including 'colonial and contemporary forms of discriminatory planning' (Furlong, 2014: 145).

The creation new institutional spaces has greatly benefited the dialogue between the State, business and civil society and significantly contributed to consolidating cycling policy in the city. It is therefore necessary that, echoing Ramos Meija et al. (2018: 222), 'socio-institutional sustainability should be at

the centre of transitions studies in developing countries'. As a result of Brazil's recent legacy of participatory politics, the creation and operation of various participatory spaces in Brazil have been studied abundantly (Avritzer, 2002; Novy & Leubolt, 2005; Holston & Caldeira, 2015; Friendly & Stiphany, 2019). Still, they are mostly situated in literature on urban planning and participatory politics, whilst the theoretical link with transition literature is often missing (Ramos Meija, 2018). This study aimed to fill that caveat.

By introducing organizational management and political strategies to the MLP, more attention was given the specific roles and organizational development of different actors promoting bike use in São Paulo. The novelty of this methodological approach showed the value of going beyond mere niche actor interaction. Instead, by analysing the niche development over time, this study identified how niche actors managed to reconfigure the mobility regime, consolidating cycling policy at the city level.

## 7.3. Recommendations for Business and Civil Society

The findings of this case study analysis reveal some recommendations. Although the recommendations are based on the case study in Sao Paulo, some of the recommendations might be applicable to other Global South cities with similar socio-economic and political conditions.

### Stimulate learning between niche actors

Fostering a continuous engaging relationship between cycloactivist organizations, knowledge institutes, and private actors will strengthen the niche's ability to influence policy-making and reach out to the city's citizens. In the past, the exchange of ideas, information and other resources has shown to bring fruitful results. Future activities could aimed at learning between actors could be facilitated by low-key workshops and high-level conferences facilitated by alternating actors.

### Continue to depoliticize cycling policy

Cycling policy continues to be a highly politicized topic, creating much resistance from many sides, often fuelled by partisan frames. The recent change use of the frame "road safety" to demand cycling infrastructure has been effective. Private actors promoting PBSS also assist in moving the debate away from politicized cycloactivist organizations, to a broader coalition of 'neutral' supporters. Attracting international organizations (such as Bloomberg) help legitimize efforts and adds credibility to niche actors.

### Foster technical assistance to regime actors

Fostering the skills to provide useful policy input and discussion will legitimize niche actors' efforts. Presenting evidence-based technical assistance, preferably by a broad coalition of actors will increase adoptability by the government authorities.

## 7.4. Recommendations for Policy

Based on the presented findings and related literature, four recommendations for policy are also suggested. Although based on the case of São Paulo, the recommendations aim to transcend the case study area.

### Shift priority and investment from motorized to clean mobility

Cycling and walking have demonstrated positive effects on citizens' health, environment and personal budgets. Shifting priority and investments to facilitating active travel and mass transit have the potential to halve the city's $CO_{2eq}$ emissions from road transport (e.g., –3.6 million tons of $CO_{2eq}$ emissions in 2040) (De Sá et al., 2017). The reduction would be in line with the commitment of a 'drastic reduction in the greenhouse gases emissions' (Municipality of São Paulo, 2012).

### Close government involvement in PBSS leads to inclusive mobility

A range of provision models and many types of regulations for PBSS are possible. Privatized accreditation models save the city government funds, but results in issues of inclusiveness. Closer involvement of the government in PBSS is suggested by giving priority to clean and inclusive mobility. Deploying a public bidding model enables the government to set standards in pricing, station locations, and intermodality options, which would be in the interest of the public good.

### Foster the legitimacy of participatory spaces for innovation and legitimacy

Based on a rich amount of literature and the results of the present case, fostering the legitimacy of participatory spaces for land use and transport planning is suggested. This is of special importance in the Global South, where top-down processes may not enjoy the same amount of legitimacy as in developed countries. Legitimizing participatory spaces could be enhanced if senior policy makers attend meetings and output of deliberations is taken into serious account for policy-making. The spaces could be further innovated by

facilitating scenario-building and backcasting exercises, making the spaces more attractive to a wider audience.

## Promote compact city design with sustainable transport

A decentralised city design with mixed use urban planning would save many travelling hours and result in safer, healthier and happier citizens. Urban planning models such as People Near Transit and Development Oriented at Sustainable Transport (ITDP, 2015) offer useful methodological tools to holistically address land use, transport and economic development policies. As stressed in this study, the private sector could play a role in well-managed public-private relationships, offering resources and efficient management in mobility service provision and infrastructure development. Civil society, in conjunction with the state, should safeguard the interest of the public good.

# 8. Conclusion

The enormous growth of public bike sharing systems has renewed the attention for the bicycle as a sustainable and inclusive mode of transport for cities across the world. Public bike sharing systems, integrated into the broader network of public transport have the potential to play an important part in the creation of more just and sustainable cities.

Recent developments in digitalization have created myriad opportunities to offer digital mobility services and facilitating seamless intermodality. While private companies have an important role in pushing 'green niches' like public bike sharing systems, public interests are not always secured in public-private relationships. Issues of justice arise especially in the Global South. This underscores the role for civil society actors and citizen participation to reorient commercial activities and mobility policy for the public good.

This study addressed the promotion of one 'green niche' to counter a worldwide societal problem: the advancement of the fossil fuel powered automobile as the primary means for urban mobility. Drawing on the detailed case study of São Paulo, Brazil, it has shown how land use and transport policies during the 20$^{th}$ century created multiple-lock mechanisms, which have developed barriers that are visible today. The collaborative efforts of various niche actors in depoliticizing cycling policy has successfully led to a consolidation of cycling policy, albeit caution about its stability is necessary. This study further suggested that civil society-private relationships and democratization processes promote innovation and sustainable mobility. This research has suggested both are essential for achieving clean and inclusive mobility.

Future research should be directed towards further empirically testing the MLP in Global South cities dealing with ill-functioning institutions and issues of justice. Particularly, the focus on socio-institutional development and political strategies in studying transitions demand further scrutiny. Although power plays an important role in the case presented here too, 'power exercises' by regime actors, such as the State, were not analysed thoroughly. More empirical research should be done on how niche actors can counter and overcome resistance tactics from powerful actors, in order to further promote green niches. Finally, the relatively low level of car ownership per capita in Brazil gives hope that 'leapfrogging' to clean and inclusive mobility is still possible. However, the position of the automobile for urban mobility remains strong, mainly due to socio-cultural values and beliefs. The underlying capitalist ideology of private ownership, and the role that civil society actors play in changing these paradigms, should indeed be taken into account in future research.

Bicycles in general, and public bike share systems in particular, have the ability to draw on counter discourses that challenge the dominant regime of motorized urban mobility. We have seen that private and civil society actors have an increasingly important role in changing the discourse, advocating for clean and inclusive mobility in the São Paulo. Looking at the past decennium, significant changes have been made in terms of urban mobility policy. It will now be the task of these actors, together with the State, to get its citizens on two wheels.

# 9. References


Abe, K. C., & Miraglia, S. G. E. K. (2016). Health impact assessment of air pollution in São Paulo, Brazil. *International Journal of Environmental Research and Public Health, 13*(7), 694.

Andersen, L., P. Schnohr, M. Schroll, and H.O. Hein. 2000. All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work. *Archives of Internal Medicine*. *160*, 1621-1628.

Avritzer, L. (2002). *Democracy and the Public Space in Latin America*. Princeton University Press.

Banister, D., 2008. The Sustainable Mobility Paradigm. *Transport Policy* 15 (1), 73–80.

Brinkerhoff, D. W., & Brinkerhoff, J. M. (2011). Public-Private partnerships: perspectives on purposes, publicness and good governance. *Public Administration and Development, 31*, 2–14.

Caldeira, T., & Holston, J. (2015). Participatory urban planning in Brazil. *Urban Studies, 52*(11), 2001-2017.

Coenen, L., Benneworth, P., Truffer, B., (2012). Toward a spatial perspective on sustainability transitions. *Resarch Policy, 41* (6), 968-979

Companhia de Engenharia de Trafego (TEC) (2020) Prefeitura anuncia plano cicloviário com novas conexões e reformas nas ciclovias e ciclofaixas da cidade. Retrieved 10-01-2020 from: https://cetsaopaulo.blogspot.com/2019/12/prefeitura-anuncia-plano-cicloviario.html

Datta, A., & Shaban, A. (Eds.). (2016). *Mega-Urbanization in the Global South: Fast cities and new urban utopias of the postcolonial state*. Taylor & Francis.

De Boer, M. A. H., & Caprotti, F. (2017). Getting Londoners on two wheels: A comparative approach analysing London's potential pathways to a cycling transition. *Sustainable Cities and Society*, *32*(April), 613–626.

De Oliveira (2016, October 10) Vinte e cinco promessas que Doria já fez para a cidade de São Paulo. *El País.* Retrieved 19-02-2020 from: https://brasil.elpais.com/brasil/2016/10/07/politica/1475865800_306198.html

De Sá, T. H., Tainio, M., Goodman, A., Edwards, P., Haines, A., Gouveia, N., ... & Woodcock, J. (2017). Health impact modelling of different travel patterns on physical activity, air pollution and road injuries for São Paulo, Brazil. *Environment international, 108*, 22-31.

De Sá, T. H., Edwards, P., Pereira, R. H. M., & Monteiro, C. A. (2019). Right to the city and human mobility transition: The case of São Paulo. *Cities, 87*, 60-67.

Department of Transit (Denatran) (2018) Frota de Veículos – 2018. Retrieved 11-

03-2020 from: https://www.denatran.gov.br/component/content/article/115-portal-denatran/8552-estat%C3%ADsticas-frota-de-ve%C3%ADculos-denatran.html

Earle, L. (2017). *Transgressive Citizenship and the Struggle for Social Justice: The Right to the City in São Paulo*. London: Palgrave Macmillan

Economist Intelligence Unit (2019) Democracy Index 2019. Retrieved 14-02-2020 from https://www.eiu.com/topic/democracy-index

European Commission (2000). Cidades para bicicletas, cidades de futuro**.** Luxemburgo: Serviço das Publicações Oficiais das Comunidades Europeias, 2000. Retrieved 06-02-2020 from: http://ec.europa.eu/environment/archives/cycling/cycling_pt.pdf

Exame (2020, Febuary 17) Uber apresenta proposta para operar ciclofaixas de lazer em SP. *Exame.* Retrieved 18-02-2020 from: https://exame.abril.com.br/negocios/uber-apresenta-proposta-para-operar-ciclofaixas-de-lazer-em-sp/

Fishman, E. and Schepers, P. (2018), "The Safety of Bike Share Systems", ITF Discussion Papers, *International Transport Forum*, Paris.

Fishman, E., Washington, S., & Haworth, N. (2013). Bike share: a synthesis of the literature. *Transport reviews, 33*(2), 148-165.

Folha de São Paulo (2019, August 31) Sem patrocínio, Prefeitura de SP suspende Ciclofaixa do Lazer. *Folha de São Paulo*. Retrieved 18-02-2020 from: https://www1.folha.uol.com.br/cotidiano/2019/08/sem-patrocinio-prefeitura-de-sp-suspende-ciclofaixa-do-lazer.shtml

Furlong, K. (2014). STS beyond the 'modern infrastructure ideal': Extending theory by engaging with infrastructure challenges in the South. *Technology in Society. 38*, 139–147.

Furness, Z. (2007). Critical Mass, Urban Space and Vélomobility. *Mobilities 2*(2), 299–319.

Hueskes, M., Verhoest, K., & Block, T. (2017). Governing public–private partnerships for sustainability: An analysis of procurement and governance practices of PPP infrastructure projects. *International Journal of Project Management, 35*(6), 1184–1195.

Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy*, *31*(8–9), 1257–1274.

Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions.* Elsevier B.V.

Geels, F. W. (2012). A socio-technical analysis of low-carbon transitions:

introducing the multi-level perspective into transport studies. *Journal of Transport Geography*, *24*, 471–482.
Geels, F. W. (2014). Regime Resistance against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective. *Theory, Culture & Society, 31*(5), 21–40.
Geels, F.W., Kemp, R., Dudley, G., LyonsF G. (Eds.), (2011). *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport*. Routledge, New York
Giddens, A., (1984). *The Constitution of Society: Outline of the Theory of Structuration*. University of California Press, Berkeley.
Globo (2019, December 19) Prefeitura de SP promete entregar 173 km de novas ciclovias até dezembro de 2020. *Globo*. Retrieved 20-02-2020 from: https://g1.globo.com/sp/sao-paulo/noticia/2019/12/09/prefeitura-de-sp-promete-entrega-de-parque-paraisopolis-em-2020-canalizacao-de-corrego-segue-sem-previsao.ghtml
Globo (2020, January 21) Bikes compartilhadas da Yellow deixam de circular no Brasil. *Globo*. Retrieved 19-02-2020 from: https://g1.globo.com/carros/noticia/2020/01/22/bikes-compartilhadas-da-yellow-deixam-de-circular-no-brasil.ghtml
Gopakumar, G. (2010). Sustainability and the indispensability of politics: a study of sanitation partnerships in urban India. *International Journal of Sustainable Society*, *2*(4), 376-392.
Grin, J., (2010). Understanding transitions from a governance perspective. In: Grin, J., Rotmans, J., Schot, J. (Eds.), *Transitions to Sustainable Development*. Routledge, pp. 223–319
Hajer, Maarten. (1997). *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*. Oxford: Clarendon Press.
Henry, E. and Zioni, S. (Eds.) (1995). Ônibus na metrópole: As articulações entre iniciativa privada e intervenção pública em São Paulo. In: Brasileiro, A., Henry, E. et al. (Org.). *Viação ilimitada: ônibus das cidades brasileiras*. São Paulo: Cultura Editores Associados, p.119-186.
Holston, J. (2009). *Insurgent citizenship: Disjunctions of democracy and modernity in Brazil*. Princeton university press.
Horton, D. (2006). Environmentalism and the bicycle. *Environmental Politics*, *15*(1), 41–58.
IBGE (2019) PIB dos Municipios. Retrieved 11-03-2020 from: https://www.ibge.gov.br/apps/pibmunic/
INRIX (2018). INRIX Global Traffic Scorecard. Retrieved 09-11-2019 from http://inrix.com/scorecard/
Intergovernmental Panel on Climate Change (IPCC) (2018) Special report on

Global Warming of 1.5°C. Retrieved 15-11-2019 from: https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/

ITDP (2014). Guia de Planejamento de sistemas de bicicletas compartilhadas. Retrieved 06-02-2020 from: www.itdp.org.

ITDP (2015) Guia de Implementação de Políticas e Projetos de DOTS. Retrieved 16-03-2020 from: https://itdpbrasil.org/guia-dots/

Jacobs, J. (2016). *The Death and Life of Great American Cities*. Vintage.

Kemp, R., Schot, J., Hoogma, R. (1998). Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management. *Technology Analysis and Strategic Management* 10 (2), 175–196.

Koop, E. (2016). Provo pleitte in 1965 voor elektrische fiets. Retrieved 13-02-2020 from: https://historiek.net/provo-pleitte-in-1965-voor-elektrischefiets/58943/

Leão, M. L. (1945) *o Metropolitano de São Paulo*. São Paulo.

Leite, C., Leite, S., Feijó Cruz, M., & Rosin, L. B. (2018). Difusão da política cicloviária no município de São Paulo: resistências, apoios e o papel da mídia. *Revista de Administração Publica, 52*(2), 244–263.

Lindenberg Lemos, L. (2020) Cycling advocacy in São Paulo: influence and effects in politics, in *The Politics of Cycling Infrastructure: Spaces and (In)Equality*, Eds: Koglin, T. & Cox, P. Bristol: Policy Press

Lindenberg Lemos. L., & Neto, H. W. (2014). Cycling infrastructure in São Paulo: Impacts of a leisure-oriented model. 12th Annual Conference of the International Association for the History of Transport, *Traffic and Mobility*, *13*.

Maricato, E. (1987). *Política habitacional no regime militar*. Rio de Janeiro: Paz e Terra.

Markard, J., Raven, R., Truffer, B., (2012). Sustainability transitions: an emerging field of research and its prospects. *Research Policy 41,* 955-967

Marques, E. (2016). *São Paulo in the Twenty-First Century: Spaces, Heterogeneities, Inequalities*. New York: Routledge

Marques, E. (2018). *As políticas do urbano em São Paulo* (ed.). São Paulo: Ed. Unesp/CEM.

Mazzucato, M. (2015). *The entrepreneurial state: Debunking public vs. private sector myths*. Anthem Press.

McCarthy, J., Zald, M., (1977). Resource mobilization and social movements. *American Journal of Sociology, 82*, 1212–1241

Metropolitican Company of São Paulo (Metro)(2019) Pesquisa Origem Destino 2017 – 50 anos: a mobilidade urbana da região metropolitan de São Paulo em detalhes. Retrieved 19-12-2019 from:

http://www.metro.sp.gov.br/pesquisa-od/arquivos/Ebook%20Pesquisa%20OD%202017_final_240719_versao_4.pdf

Montero, S. (2017). Worlding Bogotá's Ciclovía From Urban Experiment to International "Best Practice." *Latin American Perspectives, 213*(2), 111–131.

Municipality of São Paulo (n.d.) Ciclovias – SP 400. Retrieved 09-03-2020 from: http://www.capital.sp.gov.br/cidadao/transportes/bicicletas/onde-ndar/ciclovias-sp400km

Municipality of São Paulo (2012). Sp2040: A cidade que queremos. (São Paulo). Retrieved 24-03-2020 from: https://www.crasp.gov.br/crasp/site/na-sede/sp-2040---a-cidade-que-queremos

Municipality of São Paulo (2017) Resolução Secretaria Municipal de Mobilidade e Transportes – SMT/CMUV. Nº 17 de 12 dezembro de 2017. Retrieved 17-02-2020 from: http://legislacao.prefeitura.sp.gov.br/leis/resolucao-comite-municipal-de-uso-do-viario-cmuv-17-de-12-de-dezembro-de-2017

Municipality of São Paulo (2017) Decreto Nº 57.889 21 september 2017. Retrieved 17-02-2020 from: http://legislacao.prefeitura.sp.gov.br/leis/decreto-57889-de-21-de-setembro-de-2017

Municipality of São Paulo (2018) Os conceitos de Visão Zero e Sistemas Seguros. Retrieved 09-03-2020 from: https://www.prefeitura.sp.gov.br/cidade/secretarias/transportes/vida_segura/index.php?p=262881

Nikitas, A., Kougias, I., Alyavina, E., & Njoya Tchouamou, E. (2017). How Can Autonomous and Connected Vehicles, Electromobility, BRT, Hyperloop, Shared Use Mobility and Mobility-As-A-Service Shape Transport Futures for the Context of Smart Cities? *Urban Science, 1*(4), 36.

Pereira, J. L., Vieira, D. A. D. S., Alves, M. C. G. P., César, C. L. G., Goldbaum, M., & Fisberg, R. M. (2018). Excess body weight in the city of São Paulo: Panorama from 2003 to 2015, associated factors and projection for the next years. *BMC Public Health*, 18(1), 1–13.

Rabello, R. C. (2019*)* Sistema Público de Bicicletas Compartilhadas: a Disputa do espaço urbano. Master's thesis. University of São Paulo.

Ramos-Mejía, M., Franco-Garcia, M. L., & Jauregui-Becker, J. M. (2018). Sustainability transitions in the developing world: Challenges of socio-technical transformations unfolding in contexts of poverty. *Environmental Science and Policy*, 84, 217–223.

Rede Nossa São Paulo (2018). Viver em São Paulo: Mobilidade Urbana na Cidade. Retrieved (11-03-2020) from: https://www.mobilize.org.br/midias/pesquisas/viver-em-sao-paulo-mobilidade-urbana-na-cidade.pdf

Requena, C. (2016) Mobility Inequalities in a Road Transport System, in *Sao Paulo in the 21st Century: Spaces, Hetereogeneities, Inequalities*, Ed: Eduardo Marques. Routledge: New York

Rezende, V. F., & Ribeiro, F. A. (2010). Modern Urbanism & Architecture in Brazil: the Emergence and Growth of New Concepts in the Vargas Era. Urban Transformation, 14th IPHS Conference Paper. Retrieved 13-03-2020 at: http://www.iphs2010.com/abs/ID47.pdf

Rip, A., Kemp, R. (1998). Technological change. In: Rayner, S., Malone, E.L. (Eds.), *Human Choice and Climate Change*, vol. 2. Battelle Press, Columbus, OH, pp. 327–399

Romijn, H., Raven, R., & de Visser, I. (2010). Biomass energy experiments in rural India: Insights from learning-based development approaches and lessons for Strategic Niche Management. *Environmental Science & Policy, 13*(4), 326-338.

Rosa, E.,S., Schroeder,T (2014). Bicicleta como objeto promotor da inclusão social. XXVIII Congresso de Pesquisa e Ensino em Transporte – ANPET. Curitiba, Retrieved 05-02-2020 from: http://www.anpet.org.br/xxviiianpet/anais/documents/AC366.pdf

Rotmans, J., & Loorbach, D. (2009). Complexity and transition management. *Journal of Industrial Ecology, 13*(2), 184-196.

Rtveladze, K., Marsh, T., Webber, L., Kilpi, F., Levy, D., Conde, W., Brown, M. (2013). Health and economic burden of obesity in Brazil. *PLOS One, 8*(7), 1-10

Sadik-Khan, J.. Solomonov, S. (2016) *Street Fight: Handbook for an Urban Revolution*. New York: Penguin

Shi, J. G., Si, H., Wu, G., Su, Y., & Lan, J. (2018). Critical factors to achieve dockless bike-sharing sustainability in China: A stakeholder-oriented network perspective. *Sustainability, 10*(6), 2090.

Slingerland, M., Schut, M., 2014. Jatropha developments in Mozambique: analysis of structural conditions influencing niche-regime interactions. *Sustainability, 6* (11), 7541–7563.

Soares, A., Guth, D. (2018) *O Brasil que Pedala: a Cultura de Bicicleta nas Cidades Pequenas*. Rio de Janeiro: Jaguatirica

Secretary of Mobility and Transport (2015). PlanMob/SP 2015: Plano de Mobilidade de São Paulo. Retrieved 11-01-2020 from: https://www.prefeitura.sp.gov.br/cidade/secretarias/transportes/planmob/index.php?p=189299

Secretary of Mobility and Transport (2017) Decreto No. 57.889 de 21 dezembro 2017. Dispõe sobre o compartilhamento de bicicletas em vias e logradouros públicos do Município de São Paulo. Retrieved 10-01-2020 from:

http://legislacao.prefeitura.sp.gov.br/leis/decreto-57889-de-21-de-setembro-de-2017/detalhe

Sen, A., (2000). Social Exclusion: Concept, Application and Scrutiny Social Development Papers. Retrieved 19-03-2020 from: http://www.adb.org/sites/default/files/publication/ 29778/social-exclusion.pdf

Smith, A., Fressolli, M., Thomas, H. (2014). Grassroots innovation movements: challenges and contributions. *Journal of Clean Production*. *63*, 114–124

Schot, J.W., (1998). The usefulness of evolutionary models for explaining innovation: the case of The Netherlands in the nineteenth century. *History of Technology* 14, 173–200

Swilling, M., Annecke, E., (2012). *Just Transitions: Explorations of Sustainability in an Unfair World*. UCT Press.

UN-Habitat (2012) *State of Latin American and Caribbean cities.* Retrieved 23-02-2020 from: https://oldweb.unhabitat.org/books/state-of-latin-american-and-caribbean-cities-2/

Unruh, G.C., (2000). Understanding carbon lock-in. *Energy Policy, 28*(12), 817–830.

Van Driel, H., Schot, J.W., (2005). Radical innovation as a multi-level process: introducing floating grain elevators in the port of Rotterdam. *Technology and Culture, 46*, 51–76.

Vasconcellos, E. (1997). The making of the middle-class city: transportation policy in São Paulo. *Environment and Planning, 29*, 293-310

Vasconcellos, E. (1999). *Circular é preciso, viver não é preciso: a história do trânsito na cidade de São Paulo*. São Paulo: Annablume/Fapesp

Vergragt, P. J., & Brown, H. S. (2007). Sustainable mobility: from technological innovation to societal learning. *Journal of Cleaner Production, 15*(11–12), 1104–1115.

Verschuren, P., Doorewaard, H., & Mellion, M. (2010). *Designing a research project (Vol. 2).* The Hague: Eleven International Publishing.

Wakeford, J. (2012). Socioeconomic Implications of Global Oil Depletion for South Africa: Vulnerabilities, Impacts and Transition to Sustainability, Thesis (PhD). Stellenbosch University

Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., de Souza Dias, B. F., ... & Horton, R. (2015). Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health. *The Lancet, 386*(10007), 1973-2028.

World Bank (2020). GINI index (World Bank estimate) – Brazil. Retrieved 11-03-2020 from: https://data.worldbank.org/indicator/SI.POV.GINI?locations=BR

World Commission on Environment & Development (WCED) (1987). Our Common Future. Oxford University Press, New York

Zee, R. (2016, April 26) Story of cities #30: how this Amsterdam inventor gave bike-sharing to the world. *The Guardian.* Retrieved 10-12-2019 from: https://www.theguardian.com/cities/2016/apr/26/story-cities-amsterdam-bike-share-scheme

# Appendix A: Overview of Respondents

| # | Name | Function | Organization | Organizational Group | Interview Date |
|---|---|---|---|---|---|
| 1 | Marina Harkoth | Representative | Thematic Chamber of the Bike | Civil Society | 16-12-2019 |
| 2 | Ricardo Silva | Researcher | Unifesp | University | 17-12-2019 |
| 3 | Leandro Valverdes | Activist | CicloUrbana | Civil Society | 18-12-2019 |
| 4 | Larissa Marco | Representative | Thematic Chamber of the Bike | Civil Society | 07-01-2020 |
| 5 | Fernanda Bardelli | Coordinator PBSS | CicloCidade | Civil Society | 09-01-2020 |
| 6 | Letícia Lindenberg Lemos | Researcher | USP | University | 13-01-2020 |
| 7 | Glaucia Pereira | Consultant | Multiplicidade Mobilidade Urbana | Company | 13-01-2020 |
| 8 | Aline Cavalcante | Founder/Participation Director | CicloCidade | Civil Society | 14-01-2020 |
| 9 | Luiza de Andrada e Silva | Director | Instituto Cidade em Movimento | Civil Society | 14-01-2020 |
| 10 | Lucian Bernardi | Member | Bike Zona Sul | Civil Society | 14-01-2020 |
| 11 | Jô Pereira | General Director | CicloCidade | Civil Society | 15-01-2020 |
| 12 | Martina Horvath | Manager | Bike Anjo | Civil Society | 15-01-2020 |
| 13 | André Castro | Ex-chef Technical Department | Municipality of São Paulo | Government | 20-01-2020 |
| 14 | Carolina Cominotti | Urbanist | Municipality of São Paulo | Government | 20-01-2020 |
| 15 | Daniel Guth | Director | Aliança Bike | Civil Society | 21-01-2020 |
| 16 | Renata Falzoni | Founder | Bike é Legal | Civil Society | 22-01-2020 |
| 17 | Suzana Nogueira | Cycling policy coordinator | Municipality of São Paulo | Government | 30-01-2020 |
| 18 | Thiago Benicchio | Founder | CicloCidade | Civil Society | 31-01-2020 |
| 19 | Sergio Avelleda | Ex-Secretary of Mobility & Transport | Municipality of São Paulo | Government | 03-02-2020 |
| 20 | Anonymous* | - | Grow Mobility | Company | 11-02-2020 |
| 21 | Renata Raballo, Debora Gonçalves, Marina Marques | Manager Urban Planning & coordinators Urban Planning | Tembici | Company | 11-02-2020 |
| 22 | Ciro Biderman | Ex-Director | SPTrans | Government | 12-02-2020 |
| 23 | Flavio Soares | Member | Ciclocidade | Civil Society | 13-02-2020 |
| 24 | Patrícia Maria de Jesus | Researcher | UFABC | University | 14-02-2020 |
| 25 | Bianca Macêdo | Coordinator PBSS | Municipality of Fortaleza | Government | 05-03-2020 |

*Due to corporate sensitivities that were raised during the interview, the respondent wishes to remain anonymous.

# Appendix B: Interview Guides

## Interview Guide: private actors

**Opening questions**

- Could you tell me something about your organization and job position here?

**History of shared-bikes in SP**

- Please tell me something about the history of shared-bikes?
    - When?
    - How did you get involved?
- Why did your business want to get involved?
    - Cidade Limpa?
    - Demand for cycling? Cultural change?

**Niche Management**

- **Actor network creation**
    - What are your relations with other actors?
        - What actors? How often do you meet? Cooperation?
    - What did the process look like?
        - Resource sharing? Competitive? How did it contribute to the niche? Opportunities/barriers?
    - Would (more of) these connections be useful in your opinion?

- **Convergence of expectations**
    - What is your long-term strategy?
        - Objective? How to get there?
    - What are the results of the first usages?
        - Changing your expectations?
    - Do your expectations align/differ from other actors? And users?

- **Learning within Niche**
    - To what extent do you collaborate with other actors within the niche?
        - Operational/knowledge-institutes/government/civil society/users?
    - How do you learn and advance?
        - Incorporate feedback? Both internal inputs (within organisation) and external (from outside)?

- **Inclusive development: technological fit with locality**
    - To what extent do your services aim to be inclusive?
        - For whom, for what reasons?
        - How was determined where the stations were located? Why (not) more in Zona Sul/Leste?
    - Is everyone in SP able to access the technology?
        - What is your organization's role in this?
    - Does the technology fit locally available resources?
        - Fit with environment (hills); capacities of people (money; CC; smartphone); economy; infrastructure (cycling lanes)
    - How do you market your service?

        - Where / what message do you try to convey?
    - To what extent have their been issues with the adoption?
        - What kind?

- **Inclusive development: community-level learning**
    - Does your organization exchange knowledge or get input from various stakeholders?
        - What; from whom; organized or sporadic?
    - Are users able to share knowledge about their experiences with the service?
        - How do you get feedback about your products?
    - Do you work together with civil society to increase familiarity of local population with cycling?

**Barriers & Drivers**

- **Open**: What are the most important barriers and drivers fostering and impeding shared-bike use?
- **Infrastructure**: the lack of enough bicycle lanes is often mentioned. Is this the main infrastructural problem?
    - What else?
- **Policy**: What government policies affect shared-bike use?
    - Federal/state/municipality?
    - Role of changing political government?
- **Markets**: what is the trend in terms of demand?
    - Consumer preferences?
- **Science**: how are knowledge institutes involved?
    - Collaboration?
- **Culture**: Is there a bike-culture developing in São Paulo? To what extent do people still want to have a car or a bike?
    - Is this changing? How?
    - **Gender**: there is a strong gap between men and women cycling. why?
        - Differences in daily activities & travel patterns?
        - Public safety?

**Closing**

- Do you ride a bike yourself?
    - Why / why not?
- Future activities?
- What do you think are actions your organisation can undertake to make the programme more sustainable and locally embedded?
- Do you know other people I should talk to?

## Interview Guide: political and administrative actors

**Opening**

- Could you tell me something about your organization and job position here?

**History of shared-bikes in SP**

- What was the vision on urban mobility of your administration? And active mobility?
    - What has influenced this? Global developments?
- When and how did the first shared-bike plan come about?
- Why?
    - What drove the need to develop a shared-bike plan for the city?
- Which actors have been involved?
    - What was the role of the other actors?
    - How did you collaborate?

**Objectives of shared-bikes**

- What were/are the objectives of the shared-bike plan?
    - Solve health issues? Solve congestion? Promote sustainability?
- Bike Sampa: currently the shared bike plan is not offered by the city, they are run by private enterprises. To what extent do they fulfill public functions?
- Were private partners also consciously used for the bike program in order to avoid the political resistance coming from car users?

**Inclusive development: technological fit with locality**

- To what extent do your services aim to be inclusive?
    - For whom, for what reasons?
    - How was determined where the stations were located? Why (not) more in Zona Sul/Leste?
- Do you think the service addresses the right needs of the majority of the São Paulo's population?
    - Input from population?
- To what extent does the service fit with locally available resources?
    - Fit with environment (hills); capacities of people (income; CC; smartphone); infrastructure (cycling lanes)
- To what extent have their been issues with the adoption?

**Policy: Infrastructure & Legislation**

- What are the most important infrastructural barriers that impede cycling in SP?
    - Lack of bike lanes, bridges, lack of signalization?
- Between 2015-16 400km bike lanes was implemented. Thereafter none, recently a plan for 170km new bike lanes have been announced. What is the rationale behind this?
    - What are the considerations when implementing new infrastructure?
    - How much resources have been used/are reserved for these plans?
- How have shared-bike systems been regulated over time?
    - Changes between Haddad & Doria/Covas administrations
    - Public & private control

- What has been / is the role, in your eyes, of civil society and private actors in the stimulation of shared-bikes & cycling in SP?
    - Most important actors?
    - What actions made the difference?
    - What is your current relation with the organizations?

**Barriers & Drivers**

- **Open**: What are the most important barriers and drivers fostering and impeding shared-bike use?
- **Infrastructure**: the lack of enough bicycle lanes is often mentioned. Is this the main infrastructural problem?
    - What else?
- **Policy**: What government policies affect shared-bike use?
    - Federal/state/municipality?
    - Role of changing political government?
- **Markets**: what is the trend in terms of demand?
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- **Culture**: Is there a bike-culture developing in São Paulo? To what extent do people still want to have a car or a bike?
    - Is this changing? How?
    - **Gender**: there is a strong gap between men and women cycling. why?
        - Differences in daily activities & travel patterns?
        - Public safety?

**Closing**

- Do you ride a bike yourself?
    - Why / why not?
- Future activities?

## Interview Guide: Civil Society organizations

**Opening**

- Could you tell me something about your organization and role here?
    - What does your organization try to accomplish?
- Why did you become active within the organization?

**Social movements & cycling in SP**

*History*

- Please tell me something about the early stages of cycling activism in SP
    - How has the movement changed over the years?
        - Organization type/objectives/supporting groups
- What were the most important turning events?
- What larger developments drove the activism?

*Objectives & strategy*

- What objectives did you aim for over the years?
    - What strategies were used to forge change?
    - Which tactics were developed?
        - Which worked / were less successful?
    - How did you adapt / change over time?
- What frames / discourses were used?
    - Rights? Safety? Sustainability?
        - Which worked / were less successful?

*Political opportunities*

- How were windows of opportunity created?
- What developments added to the momentum?
    - Cycling culture? Sustainability? Deaths of ciclists?
    - What tactics worked?
    - Change of political administrations?

*Professionalization & institutionalization*

- How did the professionalization of the movement change over time?
- How has your role in relation to the city hall changed?
    - What are your current activities in relation to the city hall?
- How has the role of activism & civil disobedience changed over time?
- Collaboration with other civil society?
    - How? Frequency? Structurally?
- How has the role of citizen/civil society participation changed over the years?
    - Conselho / Camera Tematica de Bicicleta

**Shared-bikes in SP**

- Please tell me something about the history of shared-bikes (bike Sampa, Bradesco & Yellow) in SP?
    - When?
    - How?
- What was your role in the early stages (2009-2012)?
- To what extent do you work together with the private actors in the bike share industry?
- What is the role of shared-bikes for cycling in general in SP?

- What is the view of your organization on the current shared-bike plan?
    - How do you address the government to forge change?

**Barriers & Drivers**

- **Open**: What are the most important barriers and drivers fostering and impeding shared-bike use?
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**Closing**

- Do you ride a bike yourself?
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- Future activities?