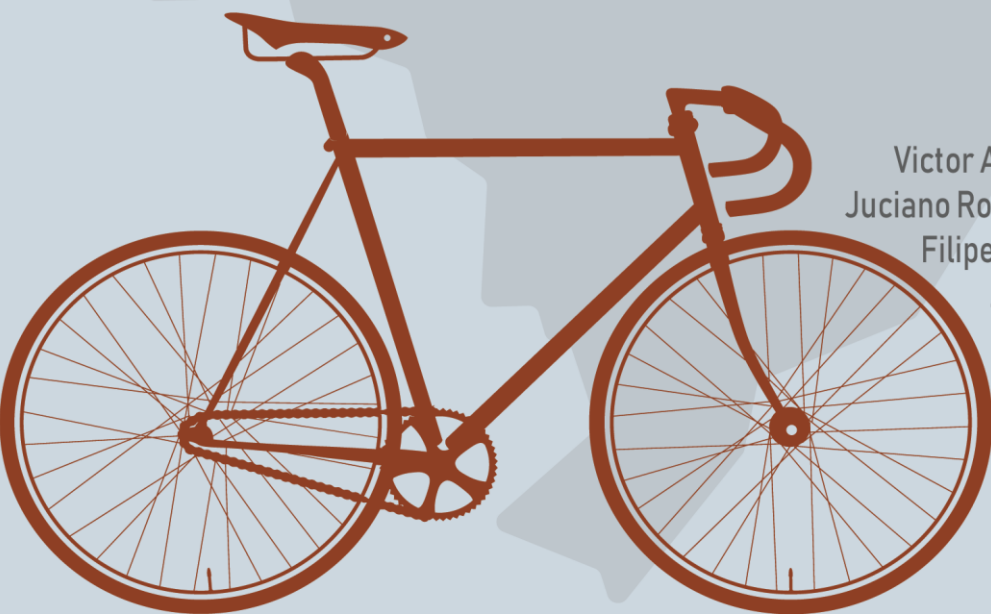


BICYCLE MOBILITY

IN BRAZIL



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Index

Preface	6
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André Trigueiro

Presentation – Knowledge production for the promotion of bicycle mobility in Brazil: possibilities and challenges	9
--	----------

Victor Andrade

Juciano Rodrigues

Filipe Marino

Zé Lobo

Chapter 1. Female and male cyclists' profile and challenges in Belo Horizonte	20
--	-----------

Carlos Edward Campos

Guilherme Lara Camargo Tampieri

Marcelo Cintra do Amaral

Chapter 2. Cyclists' Paths in Brasília/DF	53
--	-----------

Renata Florentino

Jonas Bertucci

Chapter 3. Bicycles in Manaus, Amazon (AM): production, uses and contradictions	78
--	-----------

Leonardo Andrade Aragão

Geraldo Alves de Souza

Chapter 4. Cycling mobility: convergence between the urban and tourism	104
---	------------

Juliana DeCastro

Luiz Saldanha

Fátima Priscila Morela Edra

Chapter 5. Cycling policies, activism and the Porto Alegre cyclist profile	131
---	------------

Laura Machado

Felipe Prolo

Cristiano Lange dos Santos

Chapter 6. The potential for frequent bicycle use in the city of Recife .. 163

Mariana Oliveira da Silveira
Maria Leonor Alves Maia

Chapter 7. Bicycle mobility in Rio de Janeiro: who the cyclists are, why and how they cycle..... 189

Juciano Rodrigues
Victor Andrade
Filipe Marino

Chapter 8. The collaboration of cyclists for the construction of territoriality 215

Alziro Carvalho Neto
Raul Bueno
Rodrigo Rinaldi de Mattos

Chapter 9. Bike mobility in Salvador, Bahia: freedom and liberation 239

Maria das Graças Borja Gondim dos Santos Pereira

Chapter 10. Modal migration: why we are daily losing cyclists 274

Daniel Guth

Chapter 11. Women on their bikes: how women cycle in São Paulo 305

Letícia Lindenberg Lemos
Marina Kohler Harkot
Paula Freire Santoro

About the authors..... 331

Preface

André Trigueiro

Among all the emerging themes of the 21st century, one of the most important and strategic for the promotion of quality of life on the planet is sustainable mobility. How can we plan the daily commutes of people (especially in cities) in the smartest way possible and at a low cost, with agility, reduced pollutants emission, creating health and wellbeing? The prevailing model of urban planning in Brazil – in the few cities where this happens – has moved the citizen away from his workplace, has not invested enough in public transportation and has prioritized the use of the available limited resources on road networks for cars circulation (favoring the smaller portion of the population) and bus (which is not considered public transportation as are train, subway and ferryboat).

The result is a node with the size of Brazil. In an urban country (85% of Brazilians live in cities), we replicate as metastasis a failed model of mobility that has already damaged even places where planning has always been praised as their trademark, as are the cases of Curitiba and Brasília.

If we understand cities as living systems, it would not be an exaggeration to say that the arterial compromise weakens the entire organism. Long journeys back and forth cause fatigue and depression. The greater the number of engines (stopped or at low speed in huge traffic congestions), the higher the pollutants emissions, the greater the number of sick people, the higher the cost with remedies or treatments. In this vicious circle, successive governments have justified the reduction in *Imposto sobre Produtos Industrializados* (IPI) [Tax on Industrialized Products] in times of economic crisis aiming to rid automobile manufacturers of the risk of accumulating further damage

and firing the metal workers. It is strange to evoke the economic science as justification for this, considering that numerous studies produced by reputable economists (from IPEA, Firjan, among others) show in figures the millionaire losses imposed by the increasing traffic congestions in cities like São Paulo and Rio de Janeiro.

Polemics aside, it is in this chaotic scenario that many cities around the world have begun to review their concepts. It takes courage to rethink the model and reorder priorities. In summary, it can be said that the success rate of these new projects was proportional to the reduction of the space reserved for cars. The interconnection of the different modes of transport lending organicity to planning is another common aspect to these cities that, without exception, paved the way for the bicycles. The “skinny” will never be the solution to all problems of mobility, but without a doubt, improvement in mobility includes the bicycle. Amsterdam, Copenhagen, Seville, Bordeaux, New York, Bogota, Medellin are some of the cities where one quickly realizes how prestigious bikes are in their transport system. Around here, Rio de Janeiro, São Paulo, Curitiba, Fortaleza and Campo Grande stand out due to the size of their bike paths, although there is still a long way to go to make the cities friendlier and safer for cyclists.

It is important to say that the pedal group has been already circulating since the end of the 19th century. Successive generations of cyclists have witnessed the growth of cities and the popularization of cars. But cycling activism is a new phenomenon, which has not been sufficiently studied yet, a phenomenon that has given voice to a movement that spreads itself in many directions and with the same goal: the insertion of the bicycle in urban planning. The speech is beautiful. In practice, many cyclists have literally died for believing in this dream. One of the novelties brought by cycling activists was the transformation of the pain of violent loss (in successive hit-and-runs) into a mote to demand justice, respect and space. It has worked. The

bike has become a symbol of resistance, counterculture, attitude in favor of health and citizenship. It has exponentially increased the number of Brazilians (cyclists or not) who began to see the bike as a key player in the complex game board of sustainable mobility.

Some rulers have bowed to the ideals of cycling activism moved by conviction or convenience. They have realized the cost of inaction, of doing nothing again while the node of immobility grows and makes the voters anxious. They have been surprised by bicycles counts – reliable methods of measurement were used – in parts of the city where no one had paid attention to that before. They have agreed to mobilize the municipal technical body – especially their traffic engineers – to discuss with cyclists about any possible adjustments in the projects.

The bike inspires innovation. It is the so-called governance. Ask an experienced cyclist what he thinks of the layout of the bike path, the finishing of the lanes, integration with other modes, the design of bike parking racks, and he will have something interesting to say. As more people get informed about what is at stake when the bike is formally inserted in the transport system, the lower the risk of a systemic collapse in urban mobility will be.

This book brings together relevant and unprecedented information on the habit of cycling in 10 of the most important Brazilian cities. It is, in fact, the first national-scale survey about the Brazilian cyclist profile and his/her motivations. The reader goes along, hitch-hiking, appropriating himself of revelations that make up a comprehensive diagnosis on an apparently trivial act: riding a bike. On two wheels, pedaling, a diehard group of Brazilians defies the many obstacles which still arise along the way. But it is good to remind: it was worse. And the future depends on people who will transform diagnosis into public policy.

Presentation – Knowledge production for the promotion of bicycle mobility in Brazil: possibilities and challenges

Victor Andrade
Juciano Martins Rodrigues
Filipe Marino
Zé Lobo

The panorama of urban mobility in Brazilian metropolises has become more and more critical. On the one hand, our cities have faced a long period in which no investments were made in public transport. On the other, they have been affected by an explosive increase of individual motorization. To a large extent, these factors have determined the way we are currently moving.

The conditions of urban mobility in the country have worsened and are currently easy to identify. In this scenario, portraying the last twenty years, the pioneer study of Rafael Pereira and Tim Shwhanen stands out. Conducted with data from *Pesquisa Nacional por Amostra de Domicílios* (PNAD) [National Household Sample Survey] of the *Instituto Brasileiro de Geografia e Estatística* (IBGE) [Brazilian Institute of Geography and Statistics], the study shows an upward curve in commute time in the main metropolitan regions of Brazil. At the same time, data from the 2010 Census revealed significant differences between these regions, highlighting the situation of the Metropolitan Region of Rio de Janeiro, with the highest percentage of people whose home-to-work commute time exceeded 1 hour, surpassing the Metropolitan Region of São Paulo.

In this context, the subject emerges with intensity and frequency in political and academic discussions and reaches another level. One of the reasons that brought this subject nearer the center of the debate on the

future of urban society in Brazil was the major role played by social demands in the so-called “June Days”, a series of demonstrations that started in June 2013, triggered by urban transport issues.

Since then, much has been talked about the challenges and solutions to urban mobility issues, especially those that negatively focus on the social and environmental dimensions of urban life. The overcoming of the serious mobility issues in our cities inevitably involves active transportation – understood as cycling and walking – and its key role in the construction of socially fairer and more sustainable cities.

Thus, focusing on cycling transport – without discarding its interface with other means of transportation – this book aims to present and discuss the results of the first Brazilian nationwide survey on the motivations and challenges of bicycle use as a mode of urban transport, a survey conducted in 2015.

This survey entitled the Brazilian Cyclist Profile was carried out through a partnership between the NGO *Transporte Ativo*, the *Laboratório de Mobilidade Sustentável* (LABMOB) [Sustainable Mobility Laboratory] of the Post-Graduation Program in Urbanism (PROURB) of *Universidade Federal do Rio de Janeiro* (UFRJ) [Federal University of Rio de Janeiro] and the *Observatório das Metrópoles* [Observatory of Metropolises], a national research network headquartered in *Instituto de Pesquisa e Planejamento Urbano e Regional* (IPPUR) [Institute of Urban and Regional Planning and Research] at UFRJ. This is the first Brazilian survey on the profile of urban cyclists with national scope and fills important gaps due to the scarce knowledge about bicycle users and the bicycle as a mode of urban transport in Brazil.

From this national survey, it was possible to observe the reality of cyclists in ten cities located in different regions of the country, thus seeking a greater national representation. The cities were chosen taking into consideration their geographical position and their operational

capacity to help supporting the questionnaire application. In each city, about 0.015% of the total population was interviewed. The cities were: Belo Horizonte, Niterói, Rio de Janeiro and São Paulo in the Southeast; Porto Alegre in the South; Aracaju, Salvador and Recife in the Northeast; Brasília in the Midwest and Manaus in the North.

Inspiration for the survey emerged from the project called “Bikeability” – the largest survey ever developed in Scandinavia on demographics of cyclists and their motivations and locomotion behaviors¹. Data collection and analysis strategies also had as main reference this project, which, over four years, raised the profile of the Danish cyclist and sought to better understand their main motivations for adopting the cycling modal in intra-urban commutes. In addition, the survey also used data from the Benchmark Reports, Alliance for Biking and Walking, the book entitled *Bicycle Account Guidelines* published by the League of American Bicyclists, the city of Copenhagen account, and the 2014 Bicycle Account of Bogota, produced by the NGO Despacio, headquartered in Bogota.

In Brazil it is possible to identify some isolated research on the cyclists’ profile of the major Brazilian cities, such as Rio and São Paulo, drawn up by research institutions and organizations related to the promotion of this mode. However, until now, no survey had been conducted with this scope, contemplating common axes and research guidelines, although important initiatives to gather information on bicycle mobility had already been carried out as *A bicicleta no Brasil – 2015* [Bicycle in Brazil – 2015], a book organized by *União de Ciclistas do Brasil* (UCB) [Brazilian Union of Cyclists].

Despite its central importance, we must acknowledge the existing scarce knowledge about active transportation in Brazil, especially on the profile, motivations and difficulties faced by cyclists, including

¹ ANDRADE, V.; HARDER, H.; JENSEN, OLE B.; MADSEN, J. **Bike Infrastructures**. Aalborg, Denmark: Aalborg Universitet; TUDelft, 2013.

difficulties from the academia. This scenario presents a great challenge for the actors involved in the elaboration and implementation of urban policies addressed to this mode of transport. The work of Gehl Architects (2004) discusses data abundance on motorized transport and the presence of technicians specialized in traffic engineering dealing with these data in local governments. Conversely, there is data scarcity on active transportation.

The situation in the Brazilian case is similar. Nonetheless, the national survey on the Brazilian Cyclist Profile was designed to positively contribute to a change in this scenario. The survey sought a better understanding of active transportation in Brazil and helped in the construction of a national network of researchers who used a uniform methodology addressed to facilitate this understanding. However, it is essential to recognize that the knowledge produced on active transportation in Brazil, although still scarce, mostly results from the efforts of society organizations involved in the struggle for bike mobility in the country.

The national survey on the Brazilian Cyclist Profile is the first national scale survey on the cyclist profile and his/her motivations. The survey was held during the months of July and August and involved the participation of more than 100 researchers.

In addition to *Transporte Ativo*, responsible for the survey coordination, other nine civil society organizations directly collaborated with the survey, either through coordination at each location, questionnaire elaboration, data collection and tabulation. The following organizations were involved: *Ciclo Urbano* (Aracaju), *BH em Ciclo* (Belo Horizonte), *Rodas da Paz* (Brasília), *Pedala Manaus* (Manaus), *Mobilidade Niterói* (Niterói), *Mobicidade* (Porto Alegre), *Ameciclo* (Recife), *Bike Anjo* (Salvador) and *Ciclocidade* (São Paulo).

Thus, it is worth noting that the conduction of this survey and the elaboration of this book deeply relied on the main role played by these

organizations, whether in discussions, whether in mobilizations claiming for another model of city by promoting the bicycle as a means of transportation. That is, this survey is the result of the energy of hundreds of cyclists who are on the streets every day to go to work, school, meet friends or shopping, but who have now systematically met with the aim of knowing who they are and what they think.

About 5000 cyclists were interviewed in ten cities in different Brazilian regions: Aracaju, Belo Horizonte, Brasília, Manaus, Niterói, Porto Alegre, Recife, Rio de Janeiro, Salvador and São Paulo. Since the existing lack of reliable data on the number of cyclists in each city makes it virtually impossible to design a sample with accurate statistical criteria, the questionnaire application followed mechanisms that could ensure the highest possible degree of the respondents' representativeness in each city.

Firstly, the survey design aimed to contemplate the internal territorial diversity of each location. In this way, the interviews were also distributed in the urban fabric following the division of the city in areas, called: central, intermediate and peripheral. These areas were defined by each local group involved in the survey application.

In addition to this territorial orientation, the questionnaires were applied to ensure female representation. The minimum percentage was pre-defined and was based on data from the counts provided by the civil society organizations responsible for the survey in each city. Specifically, it was recommended for each local team that the percentage of women interviews should not be less than the modal division for bicycles in each city.

This procedure was adopted with the aim of ensuring a minimum information collection about female cyclists, a necessity that became more evident after the application of the test questionnaires, since researchers reported the difficulty of interviewing women. Besides, due to the nature of the target population, in which the respondent was in

‘movement’, there was a great risk that the population of women would become even more underestimated if there were no such recommendation on the minimum approach. Such a control was instrumental in securing the smallest possible risks in the interviewees’ selection.

It is worth highlighting that the survey sought to distance itself from cycling as a leisure activity, therefore, the interviews were only carried out on workdays. This methodological strategy was instrumental in securing the central objective of the survey that was to collect information on the use of bicycles as a means of transportation.

Moreover, the definition of the target population took into account the limitations arising from the nature of this population (moveable and infinite statistically), aiming to delimit, in the most accurate way possible, who would be the informants: people who use the bicycle as a means of transportation, i.e. **“bicycle users who use the bicycle as a mode of transport at least once a week; above 12 years old, who are using, parking or pushing a bicycle”**. In technical terms, this is the analysis unit of the national survey on the Brazilian Cyclist Profile. When joined together, they will compose the population of people who use the bicycle as a means of transportation in each surveyed city.

In relation to the survey design, it is worth pointing out, finally, that these stratifications and controls were performed to ensure greater efficiency in the field survey, since – due to the peculiarity of the target population – it was not possible to apply probabilistic sampling techniques.

Currently, people riding their bicycles are more frequently seen in the streets of the major Brazilian cities. Supported by data provided by the national survey on the Brazilian Cyclist Profile, we can now know who these people are, how many days they cycle in a week, what made them start cycling or even what would make them cycle more. These are just

some of the questions answered in this survey as a contribution to the understanding of bicycle mobility in the country.

Besides the focus on the cyclist profile, the survey sought to capture the motivation of the people for adopting the bike as a means of transportation. With this book and the reflections conducted by local specialists on the subject, we hope to further advance in this field showing an interpretative approach in the search of relationships between profile, motivation and other variables.

In addition to the variables comprised by the survey (socioeconomic and demographic characteristics, for example), we sought to know to what extent cycling, as a mode of transport, is related to other explanatory elements in the context of each city, namely urban policy guidelines, cycling policy, available infrastructure, geographical and socio-spatial characteristics.

It is already known that despite some important advances, especially those that took place in São Paulo, Brazilian cities are far from what is considered the ideal active transportation system. The hegemonic urban development standard is still car-centered, and cyclists and pedestrians were placed in the background. This situation, as we have already stated, has led our cities to a collapse and shows the urgent need of an inflection in the Brazilian urban development model.

We believe that information and knowledge production about bicycle use in the major Brazilian cities is an essential part in this process, as it can qualify the discussion on the incorporation of active transportation principles and guidelines in urban planning process.

This book intends not only to add more information and more knowledge to the debate on bicycle mobility, but also to empower society to seriously discuss new paths for urban mobility in the country.

The importance and richness of the reflections are shown in each of the 12 chapters resulting from the effort and reflection of authors who have deeply analyzed the survey outcomes. This richness lies in the

diversity that arises not only from the obvious heterogeneity of the Brazilian urban network, but also from the way the general subject was approached in each city.

The book begins with a text on Belo Horizonte. In it, Carlos Edward Campos, Guilherme Tampieri and Marcelo Cintra do Amaral seek to understand, from the national survey data, the behaviors, motivations, desires and perspectives of those who cycle in the capital of Minas Gerais. In this city, male cyclists predominate, characterized by a low level of education and by an income of less than three minimum wages. Another interesting indication is that the cyclists of this city started cycling more recently than the Brazilian average, in search of speed and convenience.

In the second text of this compilation, Renata Florentino and Jonas Bertucci analyze the survey data on Brasília, focusing on the profile, motivations, demands, behavior, and on the traffic evaluation made by the people who adopted the bicycle as a means of transportation. In addition to a perception of the cyclist's behavior from an individual point of view, they draw attention to the need to understand the social and collective dynamics of the context.

In the chapter on the capital of the state of Amazonas, Leonardo Aragão and Geraldo Alves de Souza point out some peculiarities about bicycle use in Manaus. For example, the city reveals a higher use of bicycles as a means of transportation when compared to the national profile. They also emphasize that a considerable percentage of the city industrial activity derives from bicycle production. Among the conclusions, highlights are that the cyclist in this capital has been using the bicycle for more than five years, spends more time in commutes and uses the bicycle 6 to 7 days a week. However, cycling mobility issue still remains a secondary issue in the city's urban policies.

In the article entitled "Cycling mobility: convergence between the urban and tourism", Juliana de Castro, Luiz Saldanha and Fatima Edra

analyze the relationship between bicycle, mobility and tourism in the city of Niterói, supported by data of the national survey on the Brazilian Cyclist Profile. As they also focus on commuting for leisure, the authors point out the relevance of the design of an integrated public policy planning addressing bike use, which will benefit both the local population and the city visitors.

In the text on the capital of Rio Grande do Sul – Porto Alegre –, Laura Machado, Felipe Prolo and Cristiano dos Santos analyze and contextualize the survey data on the national survey on the Brazilian Cyclist Profile from the convergence of the different perspectives of each author according to their field of expertise that involves Architecture, Anthropology and Law. The authors focus on the survey results, analyzing the relationship between activism and public policies addressed to cycling. Finally, they highlight the challenges faced by cyclists in Porto Alegre and the importance of activism for the promotion of bicycle use.

A panorama on the cyclist of the capital of Pernambuco is provided by the text of Mariana Oliveira da Silveira and Maria Leonor Alves Maia. Supported by data from the national survey database on the Brazilian Cyclist Profile, the authors' analysis relates these data to two other surveys carried out in the city of Recife. Between divergences and convergences found in the three surveys, they conclude that cycling infrastructure was the most prominent variable, considered by both non-cyclists and cyclists a barrier to frequency in bicycle use. In the article, they state that the increase in the number of cyclists of Recife will be a consequence of public policies focused on the incentive of bicycle use, with expansion of cycling infrastructure, traffic education and increased public safety.

In an article about the city of Rio de Janeiro, Victor Andrade, Juciano Rodrigues and Filipe Marino analyze the profile, commute characteristics and motivations of the bicycle user in the context of the

city's urban conditions. They emphasize that the profile of the Carioca cyclist tends to be more popular, with a strong presence of workers and people with less income and schooling. The issues, in turn, are concentrated on cycling infrastructure deficiency, although they do not fully inhibit the use of bicycles as a means of transportation in the city.

The same city is contemplated in the article of Rodrigo R. de Mattos, Alziro Neto and Raul Bueno that discusses the importance of knowledge produced under the national survey on the Brazilian Cyclist Profile in light of the urban history of Rio de Janeiro. In "The collaboration of cyclists for the construction of territoriality", they emphasize how deep the shift in the transport paradigm affected the shape and use of the city, generating limitations for the use of the street and, therefore, for the act of walking and cycling.

In Salvador, Maria das Graças Pereira analyzed the motivations and decision criteria for bicycle use, advantages and barriers to the intensification of use, expanding the knowledge about the bicycle user in the capital of Bahia. In addition, the analysis was contextualized and complemented by data from other important national and regional sources, which together corroborate the necessary inflection in public policies so that they can undertake a process for re-dimensioning the bicycle as an effective means of transportation.

The largest metropolis of Latin America is the subject of the analysis in two texts. In the first one, entitled "Modal Migration: why we are daily losing cyclists", Daniel Guth presents a historical contextualization of the bicycle and of urban mobility in Brazil from legal milestones, the market and the access to the bicycle. From this perspective, he focuses on the concrete example of the city of São Paulo. Among other aspects, Guth draws attention to the need to put an end to the lack of respect on the part of motorized drivers and lack of traffic safety. Finally, he highlights the urgent need to face the physical and

symbolic barriers arising from the hegemony of motorization in the country and in the city of São Paulo.

In the second text on São Paulo, Leticia Lemos, Marina Harkort and Paula Santoro analyze the survey data from the national survey on the Brazilian Cyclist Profile from the perspective of gender. They seek to address female mobility by bicycle with the objective of discussing the hypotheses about the reasons for the differences and similarities between female and male mobility standards. In the article “Women on their Bikes: how women cycle in São Paulo”, they show – among other important findings – that women seem to be more recent supporters of the bicycle, suggesting that they have been more influenced by the recent policies of bicycle inclusion in São Paulo.

Chapter 1. Female and male cyclists' profile and challenges in Belo Horizonte

Carlos Edward Campos
Guilherme Lara Camargos Tampieri
Marcelo Cintra do Amaral

Introduction

Who are the people cycling in Belo Horizonte? Which are their wishes and needs which, if fulfilled, would encourage them to cycle more? Those were just some of the questions that guided two surveys involving female cyclists² and carried out in Belo Horizonte (BH) in 2015. The first to be mentioned is the national survey on cycling entitled the *Perfil do Ciclista Brasileiro* [Brazilian Cyclist Profile] that gave rise to the articles in this book, a survey conducted in the streets of ten cities interviewing people on their bicycles. The other is the *Descobrimo como #BHPedala* survey, entirely conducted on the Internet by local actors.

This article seeks to compare, cross-check and confront some data on who is riding a bicycle in the city of Belo Horizonte with the aim of gathering material that will enable a deeper reflection on his/her profile.

² The word “ciclista” in Portuguese (cyclist) means “who or the one who moves around by bicycle” (HOUAISS; VILLAR, 2004). Because it is a noun comprising two genders, male and female, it was used as always female (“a ciclista”) in the published Portuguese version of this article when there was no explicit reference to which gender it related (in Portuguese, it is the definite article that indicates gender, in works like this. We advocate this practice as a (micro) political positioning that discusses the question of gender, in total harmony with the spirit of article.

The main goal is to bring quantitative and explanatory elements about these people and, wherever possible, to conduct comparative analyses with the collected data: between the two surveys, between this city and the average in Brazil and between men and women.

Much has been said about the behaviors, motivations, desires, and perspectives of who pedals. Quantitative research has the merit of confronting ideas and explanatory hypotheses with data on the interviewees' profile and opinion. Frequency of use, age and gender, among other variables, help to understand who pedals. Sometimes these variables confirm common sense, sometimes they surprise us raising questions that still need further investigation so that we can better understand them. Inequality in mobility, especially in relation to gender issues, is one of these cross-cutting topics that must be explored since it has led to important debates, such as the one that took place in the national meeting *Bicicultura 2016*³ [2016 Byciculture], to which this article contributes with some information and analysis.

Initially, we present a current panorama of the public policies and cyclist movements to be confronted and complemented by the survey results. Next, we present the survey data and corresponding critical analysis, pointing to possibilities of using similar researches (or complementary) both for cycling policies and the academy.

In the end, always important, we will draw our conclusions and present issues to be explored in an attempt to record and understand the history of the bicycle in Belo Horizonte, a history that we are proud to be a part of.

³ *Bicicultura* [Byciculture] is an annual gathering of cyclists, whose 2016 edition was held in São Paulo by the *União dos Ciclistas do Brasil* (UCB) [Brazilian Cyclists Union], *Associação dos Ciclistas Urbanos de São Paulo (Ciclocidade)*, [Association of the Urban Cyclists of São Paulo], Institute AroMeiaZero, Institute CicloBR with support from numerous other institutions.

Bicycle context in Belo Horizonte

In 2015, BH had 2,502,557⁴ inhabitants in an area of 331.40 km², with an average population density of 7,167 inhabitants/km². With a pleasant climate throughout the year, its average temperature is 21°, with temperatures ranging between 16° and 31°, dry winter and rainy summer. The city has a diverse topography with hills and river valleys, which unfortunately today are almost all channeled and transformed into deep valley avenues with evident environmental impacts on urban drainage, but which are roads with very favorable conditions for cycling.

In December 2014, BH had 1,632,215 vehicles, of which 1,320,212 were light vehicles (cars, vans and pickups)⁵ accounting for 80.9% of the total, the second highest rate of motorization in the country only after Curitiba (MOREIRA; DOURADO, 2013) and the second largest number of cars per km² after São Paulo. Among the metropolises, the Metropolitan Region of Belo Horizonte was the one that had greater percentage growth between 2001 and 2012, according to an analysis of the *Observatório das Metrópoles* [Observatory of Metropolises] (2013, p. 19), with a percentage higher than the national average, rising from 841,060 (2001) to 1,880,608 cars in 2012, showing an increase of 94,504 vehicles per year.

According to the latest Origin and Destination Survey (BHTRANS, 2016a, p. 142), people residing in the capital performed 24,460 bike trips in 2002 and 26,217 in 2012⁶, with a growth of about 7.2% in the

⁴ Source: *Instituto Brasileiro de Geografia e Estatística* (IBGE) [Brazilian Institute of Geography and Statistics] (2015).

⁵ Source: BHTRANS (2015).

⁶ In the Origin and Destination Surveys, the concept of *trip* corresponds to the commute of a person who only used the bicycle, and *route* corresponds to every commute using a bicycle, even when the person uses another mode of transport. Data

use of bicycles within ten years. However, with the growth of trips in the other modes, the percentage of bike trips in Belo Horizonte between 1992 and 2012⁷ showed the following variations: 0.3% in 1995, 0.7% in 2002 and 0.4% in 2012. According to this indicator, the *Plano de Mobilidade Urbana de Belo Horizonte* (PlanMob-BH) [Urban Mobility Plan of Belo Horizonte], completed in 2010, pointed that the goal for 2020 was 6%. In its review, still ongoing and in debate in June 2016 (BHTRANS, 2016b, p. 8), this goal has been deferred to 2030, considering intermediate goals of 2% (2020) and 4% (2025). Besides, one of the goals is also to increase the number of bike trips in commutes with a travel distance of up to 8 km.

In 2012, Belo Horizonte still had 8,392 intermunicipal bike trips that made the connection with other MRBH municipalities. Thus, total bike trips, including municipal and intermunicipal cycling, reached 34,609 in 2012, thus showing an increase of 24.2% in the decade as the numbers reached 27,858 in 2002, according to BHTRANS (2016, p. 142).

Considering the totality of bike trips in the survey carried out in 2012, 93% of these trips were made by men, a result that outnumbered 2002 (84%). In addition, the Origin and Destination (OD) survey conducted in 2012 recorded the trips motivations, shown in Chart 1.1, in which one can see how diverse bike use in everyday life is.

collected by the survey on route (24,539 in 2002 and 26,351 in 2012) show that there was very little integration, 79 and 134 in 2002 and 2012, respectively.

⁷ Data provided by *Observatório da Mobilidade Urbana de Belo Horizonte* [Belo Horizonte Urban Mobility Observatory]. Available at: <http://www.bhtrans.pbh.gov.br/observatorio>. Accessed June 21, 2016.

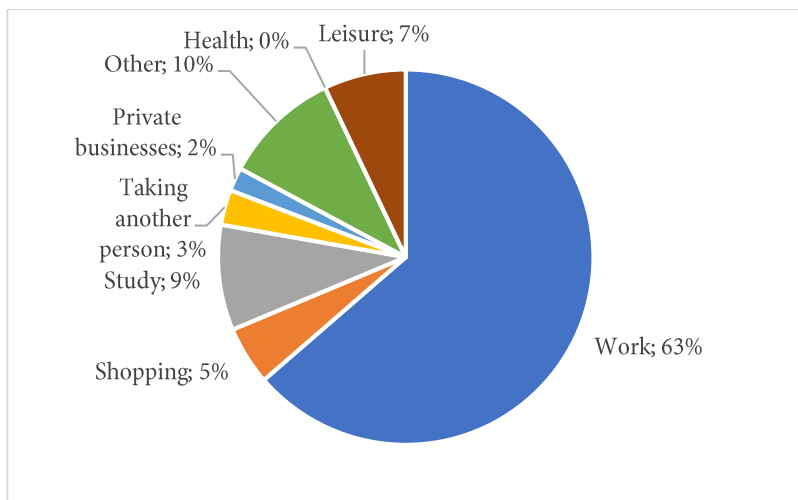


Chart 1.1. Reasons for bike trips in the 2012 Origin and Destination Survey. Source: BHTRANS (2016, p.145).

In relation to cycling distances, BHTRANS (2016a, p. 148-151) notes that most bike trips are shorter than 6 km, accounting for 95% of those recorded in the 2012 OD Survey, and 83% are shorter than 3 km (mostly in the Pampulha, Venda Nova and Northern areas that concentrate 63% of these trips) and 12% cover a distance between 3 and 6 km (mostly in the Pampulha area, followed by the Northeastern and Venda Nova areas).

It is worth emphasizing that data on bicycle commutes collected in these surveys should always be carefully analyzed. Considering that the number of bike trips in BH is still small, less than 1%, the margin of error⁸ is proportionately larger. However, this does not mean that we

⁸ Origin and household destination surveys are conducted on a sample basis, aiming to collect information on the overall daily commutes of each household. Thus, the prevalent modes and the desire lines (each origin-destination pair of each spatial unit defined in the survey, usually aggregated in larger spatial scales and associated with the number of trips) are more precise since they reproduce larger numbers in the sample and in the sample expansion.

cannot use these data in the way we use them here since they are important data for planning and management that few Brazilian cities have. Given this, they can be used to compare some numbers found in the two surveys that will be analyzed next, always having in mind that these numbers were collected four years ago, and recent changes (especially the implementation of more bike lanes and the Bike BH, which is a Belo Horizonte bicycle-sharing system) may have changed this panorama.

Public policies: from the bicycle to the car (and back to the bicycle)

The reality of the bicycle in Belo Horizonte is directly linked to the confrontation of a speech very convenient for some political sectors: the topography of the city does not favor bicycle use. For many years it was heard - and still some say - that this was the main limiting factor for the widespread bike use as a mode of transport in the city. Olivier Razemon (2014) establishes the importance of topography by quoting a survey conducted by the *Deutscher Fahrrad - Club* (ADFC - the Association of German Cyclists) that evaluated aspects of cyclability of German cities (from the metropolises to medium-sized cities):

The agglomerations (cities) of the study showed an enormous diversity in terms of the political parties that govern them, their size and topography. Contrary to well-rooted ideas, flat cities are not necessarily more prone to cycling. Nuremberg and Dresden, which are relatively mountainous areas, are better evaluated by local cyclists than Colony and Lübeck, cities that are completely flat (RAZEMON, 2014, p. 119, our translation).

We believe that the repetition of that outdated speech turns a blind eye to one fact: bicycles have always been present in the urban culture of the state capital.

Amaral (2015, p.p. 189-200) analyzes the history of Belo Horizonte focusing on mobility. According to him, the city, planned and inaugurated in 1897, with urban-inspired reforms conducted in Paris by the Baron of Haussmann, shows an initial history marked by active modes. Before the trams and automobiles, in addition to pedestrians, bicycles already had a place (still as a sport) with the foundation of the *Velo Club* in 1898, the year that the first bicycle race was carried out in the city (PENNA, 1997, p. 53).

However, in the history of the means of transportation in the city, “we can say that there is a *blind field* in relation to the walking mode” (AMARAL, 2015, p. 193) and, by extension, to bicycle use, although it seems clear that for both the richest and the poorest, in a city that was still small at those times, walking was the most used transport option.

These gaps are repeated over the decades of the history of the city recorded in books and in research. Clearly there have always been bicycles in circulation, but little is known about this although sometimes some data emerge as, for example, records of cycling rides, as the one in a photo of the City’s Public Archive in 1979 shown in Figure 1.1. In the transport and traffic policies documentation, the bicycle was totally ignored, and pedestrians were hardly mentioned. One example is the *Plano Metropolitano de Transportes* [Metropolitan Transport Plan] prepared by PLAMBEL in 1974 which shows no reference to this topic in its Volume I - Diagnosis.

It was only in the 1990’s that the active modes started to be rescued (exclusively called “non-motorized” at the time), as a reversal of priorities in which, along with public transportation, pedestrians would be prioritized. In the period between 1992 and 2000, the municipalization of transport and traffic management took place. It started in the last year of Eduardo Azeredo’s⁹ term and covered the

⁹ Eduardo Azeredo, PSDB, was elected Vice Mayor of Pimenta da Veiga and held the position of Mayor in 1990 when the latter ran for governor.

Patrus Ananias¹⁰ and Célio de Castro's¹¹ term. It was a period of resumption of transportation planning, in parallel to urban planning and to the implementation of the main actions deriving from planning.



Figure 1.1. Photos of the 1st Cycling Ride of the Republic (November 1979). Legend: The tour left the former location of the Atlético Club, Olegário Maciel Avenue. The bottom left: JK Building¹².

However, the 1990's marked the priority given to public transport in a reality of increased individual motorization. Only from 2001, in Célio de Castro/Fernando Pimentel¹³ term, the rescue of the walking mode has begun, having the city's Hypercenter as its starting point.

And only in 2005 a program that specifically focused on the bicycle was created, the *Pedala BH - Programa de Incentivo ao Uso da Bicicleta em Belo Horizonte* [Pedala BH – Incentive Program for Bicycle Use in Belo Horizonte], which had “as objective the analysis of the conditions

¹⁰ Patrus Ananias, was elected by the *Partido dos Trabalhadores* (PT) [Workers' Party] in 1992 and was Mayor for the 1993-1996 term

¹¹ Célio de Castro, PSB, was elected Mayor for the 1997-2000 term and re-elected for the 2001-2004 term, but he was removed from office in November 2002.

¹² Available at: <http://www.acervoarquivopublico.pbh.gov.br/itens.php?cid=5805;http://curraldelrei.blogspot.com.br/2015_07_01_archive.html>.

¹³ Fernando Pimentel, PT, was elected Vice-Mayor for the 2001-2004 term, and was elected Mayor in November 2002 and reelected for the 2005-2008 term.

of bicycle use as a mode of transport in Belo Horizonte and the creation of measures for encouraging its use” (BHTRANS, 2008, p. 72), contemplating the proposition of a cycling network, implementation of bicycle parking racks and educational campaigns, among other measures.

Incorporated into the *Plano de Mobilidade Urbana de Belo Horizonte* [Belo Horizonte Urban Mobility Plan] between 2008 and 2010, the *Pedala-BH* has also been undergoing joint reviews with the PlanMob-BH since 2014, from the IV Conference of Urban Policy. Currently, one can consider that the bicycle has been effectively inserted in mobility plans and laws, but it still requires greater effectiveness of results and of investment priority from the local management.

As a result of this public policy, the city of Belo Horizonte has currently about 90 km of cycling infrastructure, a bicycle-sharing system with 40 stations and 400 bicycles and some improvements to bicycle use in the city. In addition, there are several spaces and instruments of popular participation for planning, discussion and decision-making on the urban mobility policy of the city and its various developments, in which the *GT Pedala BH* stands out

GT (WG) is an open working group that works horizontally and autonomously, serving as a space for dialogue between the public power (PBH/BHTrans) and citizens interested in promoting the bike use in the city as a means of transportation. The group has an advisory nature and has been taking place monthly - on the first Wednesday of the month, for three years. The meetings are open, and anyone can join without need for registration.

Cyclists and the panorama of local movements

All people who ride their bikes share the same physical exercise, the same mechanics, the same mesmerizing rhythm and the sensation of going ahead. However, each person who pedals has a profile, a lifestyle, an experience and a reason to use the bicycle. Cities in which there is, albeit in varying levels, a bicycle culture, have a characteristic in common: the diversity of the types of bicycles and people who use them.

In recent years, in the streets of Belo Horizonte, an expressed and visible multitude of colors, sizes and shapes has stood out. In addition, more people have organized themselves in different ways to promote this use, and more people have been pedaling.

In addition to bike use on the outskirts and in the deliveries (logistics) of the city, which never ceased to be, although usually little valued by other local actors, since the 1980s new groups of cyclists have emerged and settled as the ones who go out on trails with their bicycles. Specifically, in the urban space, there are groups of “nocturnal cyclists” that show that one can cycle safely and with pleasure, besides being a way of (re)connecting people with their bicycles and the urban environment.

Various other initiatives have also marked the bicycle scenario in Belo Horizonte, promoting the bicycle as a mode of transport and also its use for leisure, sport or protest: the *Bike Anjo BH*¹⁴, the Bloco da Bicicletinha (Carnival block that celebrates the bicycle), the Velodrome of Raul Soares (an improvised street velodrome), the *Bike Polo BH*, *Ciclo Bazar de Rua*, the *Pedal dos Rôia* and *Pedal do Chaves* (a group that encourages cycling for beginners and is promoted by the BH Bike Anjo), the *Massa Crítica BH*¹⁵, the Tweed Ride BH (“Cycle Chic” retro

¹⁴ The *Bike Anjo* is a national collective network created to stimulate bicycle use in daily life and it is present in several Brazilian cities. Source: www.bikeanjo.org [accessed August 7, 2016].

¹⁵ The *Massa Crítica BH* [BH Critical Mass] is organized in a horizontal way. It takes place on the last Friday of the month in several cities in the world, when cyclists, skaters,

bike ride), Dizzy Express (deliveries by bicycle), the *Bicicine* (popular cycling atelier-workshop), among others.

Given this scenario, it was necessary to create an organization that would provide representation and an active voice for cyclists in the public policies of the city, which occurred in 2012 with the establishment of *BH em Ciclo - Associação dos Ciclistas Urbanos de Belo Horizonte* [Association of Belo Horizonte Urban Cyclists]¹⁶. Its objectives are to promote communication between cyclists and the public power, to raise awareness of the use of bicycles as a means of urban transportation, to encourage its use as a tool capable of reducing the effects of excessive use of private motorized transport in the city of Belo Horizonte, through six areas of activity. One of them is research. It is precisely in this area that lies our participation in the National Partnership for Mobility to produce data for the survey on the Cyclist Profile.

In addition to the streets, avenues and other public environments as maximum spaces of representation and life of these collectives, movements and organizations, Belo Horizonte has a space-symbol that helps to further promote bicycle culture in Belo Horizonte: the *Praça do Ciclista* [Cyclist Square]¹⁷. Formally named Arnold Janssen Square, it was fondly renamed by local female cyclists and from 2012 activities and meetings have been conducted on this site.

rollerbladers and others with human powered vehicles jointly occupy their space in the streets.

¹⁶ To learn more about *BH em Ciclo*, please visit www.bhemciclo.org. Accessed August 7, 2016.

¹⁷ In September 2015, the name was also adopted by Google, and now you can find the square on Google Maps.

Researching female cyclists and their bicycles in Belo Horizonte: The National Survey on the Brazilian Cyclist Profile

In the second half of 2015, *BH em Ciclo* took part of the National Partnership for Mobility by Bicycles, along with organizations and cyclists collectives in Brazil. Coordinated by *Transporte Ativo*, an organization with the cooperation of the *Observatório das Metrópoles* [Observatory of Metropolises] and of the *Laboratório de Mobilidade Sustentável* [Sustainable Mobility Laboratory] of PROURB/UFRJ, the objective of this partnership was to produce the first Cyclist Profile Survey with national scope.

Between July and August 2015, more than 100 researchers interviewed 5,012 cyclists in ten cities from different regions in Brazil: Aracaju, Belo Horizonte, Brasília, Porto Alegre, Manaus, Recife, Niterói, Rio de Janeiro, Salvador and São Paulo. The percentage of respondents in relation to the population was the same in every city, and in Belo Horizonte 372 people were interviewed, divided evenly in the city by the central, intermediate and peripheral areas, as shown in Figure 1.2. The interviews were conducted with people who cycle at least once a week, and they were approached when they were cycling, pushing or parking their bicycles.

It is apparent that there is an increase in the number of cyclists on the streets of big cities. Such a revolution, or the “cycling transition”, in the words of Olivier Razemon (2014, p. 115)¹⁸, is taking place even before the cities’ preparation for this change, so that they can promote and encourage the use of bicycles as a safer mode of transport.

¹⁸ Free translation of the French expression “Transition cyclable”. Razemon (2014) argues that this transition is a matter of political choice, or a set of policies choices, from the social bases to the offices of elective positions.

The survey results serve as subsidy for the planning and implementation of public policies that ensure comfort and safety to the new users of public roads, besides being an input that will enable civil society organizations to pressure the government so that it will implement these policies.

The survey entitled *Descobrindo como #BHPedala*, also held by *BH em Ciclo* in 2015, showed that 91.93% of the people would use public transport if they could go by bicycle to a station and park it in a safe place, which shows a big potential to develop intermodality.

In most of the interviewees' responses, the results of Belo Horizonte were similar to the national average. However, some data call more attention, because they are different from the national average, and help us to put a magnifying glass on policies of urban mobility on bicycle that we seek to implement in Belo Horizonte. An example is the fact that only 14.4% of cyclists in the city combine bike use with other modes of transport, while the average is 26.2% in Brazil.

Descobrindo como #BHPedala: a survey

In the search for data collection about the preferences, practices and nature of female cyclists in Belo Horizonte, some months before the conduction of the Brazilian Cyclist Profile, BH in Cycle and *Movimento Nossa BH*, together with more than 35 local and national institutions, including BHTrans in April 2015 conducted the *Descobrindo como #BHPedala* methodological limits survey.

This great alliance with partner institutions was carried out to give more visibility to the survey and, above all, full-coverage to get answers from the overall regions of the city, so as not to keep a territorial hegemony, whatever it might be. The survey seeks to supply the city with a broader database to support the actions of managers, civil society and, above all, of their joint actions and was based on the hypothesis

that Belo Horizonte has the potential to go far beyond the current use of bicycles as a mode of transport.

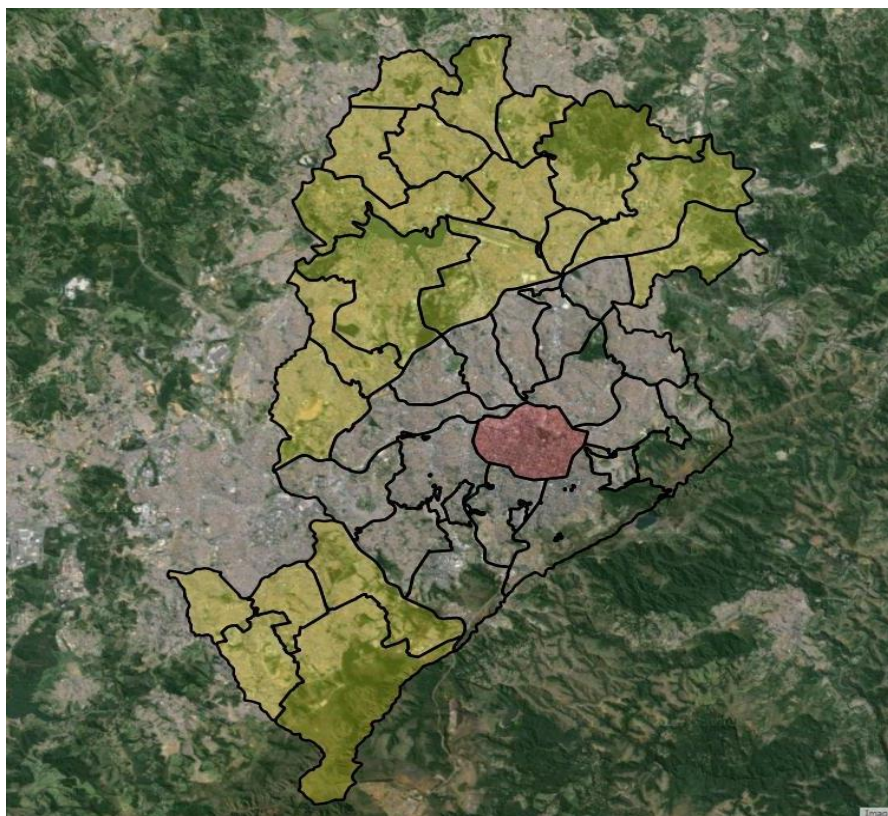


Figure 1.2. Map with the division of the surveyed areas in “central”, “intermediate” and “peripheral”. Source: Elaborated by BH em Ciclo for the national survey on the Brazilian Cyclist Profile (2015).

Among the survey goals (BH EM CICLO; MOVIMENTO NOSSA BH, 2015), highlights were to understand the ways female cyclists see cycling mobility policy in Belo Horizonte, to assess their opinions on

the city infrastructure and to get a better understanding of their overall demands. The survey was entirely conducted online, through a form with four axes:

- 1) Data and information relating to personal experiences on top of the bicycle;
- 2) Evaluation of some aspects of Belo Horizonte bicycle structures (extension, connection, maintenance, signaling, quality of road pavement and bike paths safety);
- 3) Understanding and study of demands and actions of female cyclists in the city regarding aspects such as modal integration, the need for regulation of contraflow lanes for cyclists, creation of 30 zones and others;
- 4) Preference on the existing or nonexistent types of cycling structures (typologies) in Belo Horizonte.

A total of 1,043 valid responses were received (in a period of approximately 40 days) and generated variables that can be crossed with each other in search of results on bike use in Belo Horizonte. In addition to these data, 471 suggestions were sent (from 471 different people), compliments or written complaints. This was the largest survey in the history of the capital of the State on these topics. The systematization of the responses was divided into three spheres: 1) Only people who cycle (men, women, and other); 2) Women (only people who identified themselves as women) and 3) Synthesis - All people (men, women and other who cycle or not).

Critical analysis: comparing results and discovering limits: the Female Cyclist Profile

The national survey on the Brazilian Cyclist Profile, which is the main focus of the current text, brings countless possibilities of comparative

analyses and cross-checks that cannot be covered by a single article. Given this, we chose to concentrate on some internal cross-checks, on a comparison with the national average and on a comparison between genders, which is here understood as an emerging question that will greatly profit from the survey available data.

The analyses in this article also bring results from the *Descobrindo como #BHPedala* survey and its own internal cross-checks related to gender, which enables a multidimensional comparative analysis. When we address these results, the richness of the two surveys stands out, and we realize that even with some methodological limitations, which are usual in any investigation, these two surveys have further advanced the understanding of bicycle use in Brazilian cities.

The first theme, which somehow directs the research, provides information about the attempt to characterize people who cycle in Brazilian cities. This desire to know the *female cyclists' profile* - hence the survey title-, a legitimate intent that was partially reached, presents interesting numbers about gender, age, schooling, income, frequency of bicycle use and its adoption in the urban environment (how long have you been cycling in the city?).

Age and gender are fundamental information in any demographic profiling information. According to the national survey on the Brazilian Cyclist Profile, people who cycle in Belo Horizonte are relatively young, with an average age of 33.0 years. If we only consider women, the average age is lower, 28.3 years. If we consider the average age of the set of people interviewed in all Brazilian cities, the average age is 34.9 years. The respondents of the *Descobrindo como #BHPedala* survey were in the same age group, with an average age of 34.2 years, and women were only slightly younger with an average age of 33.0 years.

In the national survey, there was an intention to search at least 3% of women since this number derived from female cyclists' data in counts carried out in 2010. The reality proved that far more women were cycling in the city evidenced by data collected in the interviews in

which 18.3% were women and 80.9% were men. Obviously, numbers still fall short of the desired gender equity in bicycle use, but, in any case, a good surprise that confirms the “how long has the person been cycling?” data.

As for income and schooling data, the sampling limitations of the national survey need a more detailed analysis and comparison with the Census conducted by the IBGE (2015), or with other sources that process these dimensions more fully. The following charts present the profiles of the results of these two issues, with predominance of high school education and income between one and two minimum wages. In compliance with the goal of this text, we chose neither to explore the intersections with the survey data nor perform the resulting analyses.

The first comparison was related to the time when bike use was adopted, evaluating whether people have already adopted it for quite some time or whether they have started cycling recently, with results shown in Table 1.1. The average results of the people who cycle in Belo Horizonte seem to indicate that it is a recent phenomenon, confirming the hypothesis presented earlier that a *cycling transition* has been occurring in the city, with 62.0% of the people who cycle declaring that they have been doing this for less than 2 years. Another comparison, related to the average of the cities surveyed, pointed out that 45.5% of people have been cycling for less than 2 years, which seems to indicate that this transition is yet newer in BH.

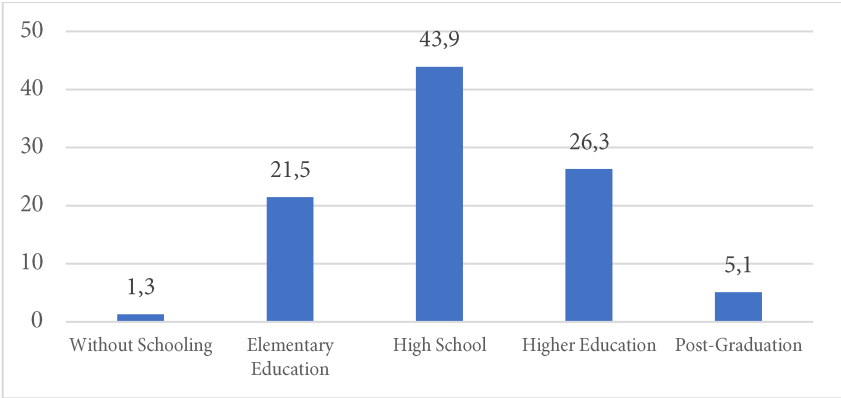


Chart 1.2. Schooling data of respondents in Belo Horizonte. Source: Transporte Ativo (2015a, p. 26).

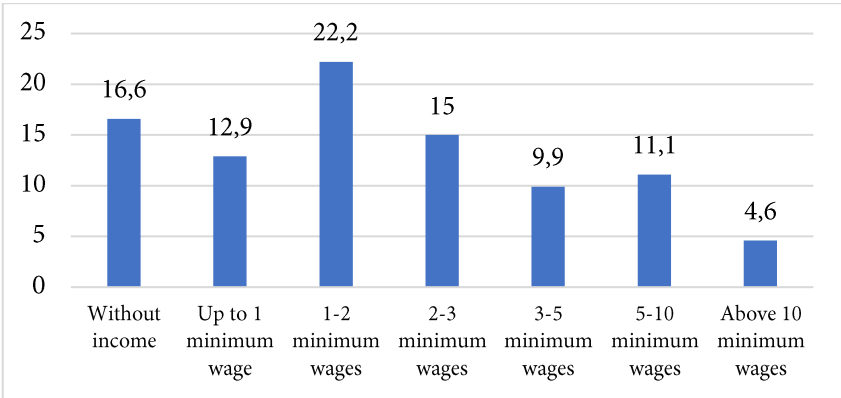


Chart 1.3. Income data of respondents in Belo Horizonte. Source: Transporte Ativo (2015a, p. 26).

The main result of the comparative analysis of the responses and cross-checks is that people have been cycling for less time (80.9% for less than five years) in BH than the national average (in which 37.3% have been cycling for more than five years). The difference is very large and indicates that the phenomenon is significantly more recent in BH,

and has been intensified after the creation of public policies for bicycles (especially the *Pedala BH*).

	<6 months	6 months to 1 year	1 to 2 years	2 to 5 years	>5
National Survey on the Brazilian Cyclist Profile					
Brazil	14.5%	15.1%	15.9%	16.3%	37.3%
BH	18.1%	23.4%	20.5%	17.8%	19.1%
Men	16.3%	21.3%	19.9%	19.3%	23.3%
Women	26.5%	33.8%	23.5%	13.2%	2.9%
Descobrimo como #BH Pedala Survey					
BH	14.2%	27%	33%	11.4%	14.4%
Men	12.1%	25.3%	32.6%	13.2%	16.9%
Women	20.5%	32.4%	34.1%	5.9%	7.0%

Table 1.1. Time of adherence to bicycle use in urban environment (2015). Sources: Transporte Ativo (2015); BH em Ciclo; Movimento NOSSA BH (2015).

In addition, a significantly higher number of men declared they have been cycling for more than 5 years (23.3% in the Profile and 16.9% in #BHPedala), a much bigger result than women (2.9% and 7.0%). Apparently, this result seems to confirm the growing and recent perception of improvement in the conditions for bicycling in general, especially among women and that the cyclists that still cycle in the city are mostly men.

The next analysis addressed the frequency of bicycle use in the city, and results are shown in Table 1.2. One must analyze the national poll numbers carefully, since the percentage of 82.5% of people declaring they use the bicycle 4 to 7 times a week may be related to the methodology used. According to it, the person considered cyclist was only the person in the act of pedaling, pushing or pulling up the bike at the time he/she was interviewed. The difference in the way the cyclist was approached is the main reason to explain why the survey entitled *Descobrimo como #BHPedala* brings quite different results to the same frequency of use: only 44.5%. The difference in approaches leads to the

fact that, in the national survey, the sample covers the universe of trips in the period surveyed (day or week) and not the universe of people who actually cycle. That is, the probability of interviewing a regular cyclist is much bigger than interviewing an occasional cyclist who was just walking or using another mode of transport when the survey was being carried out and, as a result, was not interviewed. In any case, none of the two surveys assess the whole universe of people who are riding their bikes at some time in the city, a fact that must be taken into account when interpreting the results.

	1+2+3 days <i>per</i> week	4+5 days <i>per</i> week	7 days <i>per</i> week
National Survey on the Brazilian Cyclist Profile			
Brazil	16.9%	54.4%	28.1%
BH	18.2%	54.2%	26.6%
Men	14.6%	55.5%	29.9%
Women	35.3%	51.5%	13.2%
<i>Descobrimos como #BH Pedala Survey</i>			
BH	55.7%	31.3%	13.2%
Men	51.5%	34.2%	14.3%
Women	67.2%	23.7%	9.1%

Table 1.2. Frequency in cycling (how many times a week). Sources: Transporte Ativo (2015); BH em Ciclo; Movimento NOSSA BH (2015).

The analysis of these numbers shows that the results of BH are like the average found in the Brazilian cities surveyed, which apparently indicates a certain “standard” usage. However, the difference between genders already stands out, since the current male cyclists cycle more often than the current female ones. If, on the one hand, the number of cyclists who cycle every day of the week is significant, indicating that these are people who have adopted the bicycle for their overall daily commutes, on the other hand, the results seem to confirm the

hypothesis that there are still many barriers preventing women from cycling more.

Motivations for cycling

The survey also assessed the motivational aspects. In this case, only the national survey on the Brazilian Cyclist Profile included this dimension through four questions. The first two questions are “mirrored”: motivation for starting cycling, shown in Table 1.3; and motivation for continuing cycling, shown in Table 1.4.

The motivations for starting cycling are highly diverse. General data of Belo Horizonte and Brazil are similar and with a few differences. Regarding data on the motivations for people to continue cycling, the survey has shown a balance between national average and Belo Horizonte average. However, when we look into the reasons why men and women of Belo Horizonte and Brazil (average) cycle will find differences that need further investigation.

In Brazil, 2.3% of men start cycling for environmental issues and 1.8% of women start cycling for the same reason. In Belo Horizonte, however, the opposite occurs: a total of 4.4% of women cycle for environmental issues whereas only 1.7% of men share this same motivation. That is, in Brazil, more men start cycling for environmental issues, while in Belo Horizonte more women do so (almost three times the national average).

Analyzing the results in Table 1.3, we see that, in national terms, 20.2% of men and 17.4% of women started cycling because it is cheaper. Although in Belo Horizonte more men started cycling because it is a cheaper mode of transport (24.6%), a result that overcomes the overall average, the proportion of women who cycle is lower than the national average (7.4%) in the State capital.

	Environmentally correct	Cheaper	Faster and more convenient	Healthier	Other
National Survey on the Brazilian Cyclist					
Brazil	2.2%	19.6%	42.9%	24.2%	10.5%
Men	2.3%	20.2%	43.3%	23.9%	10.3%
Women	1.8%	17.4%	40.4%	28.2%	12.2%
BH	2.1%	20.7%	41%	26.8%	7.4%
Men	1.7%	24.6%	42.4%	22.9%	8.4%
Women	4.4%	7.4%	38.2%	45.6%	4.4%

Table 1.3. Motivations for starting cycling (2015). Source: Transporte Ativo (2015).

	Environmentally correct	Cheaper	Faster and more convenient	Healthier	Other
National Survey on the Brazilian Cyclist					
Brazil	3.4%	17.7%	44.6%	25.9%	7.8%
Men	3.2%	18.3%	44.9%	25.9%	7.7%
Women	4.9%	14.1%	44.7%	27.0	9.2%
BH	2.1%	20.7%	37%	32.7%	6.4%
Men	1.3%	23.3%	39.2%	28.6%	7.6%
Women	5.9%	11.8%	30.9%	50%	1.5%

Table 1.4. Main motivation for continuing cycling (2015). Source: Transporte Ativo (2015).

One of the main results observed, both in Brazil and in Belo Horizonte, is that the main motivation for people to start using the bicycle and the main reason for continuing cycling are due to the fact that the bike is “more convenient and faster”. Being faster and convenient is the reason why 44.6% of Brazilians continue cycling and 37% of the people of Belo Horizonte do it for this reason. When we analyze the data between male and female cyclists in Belo Horizonte, we see that there is a difference between the two: 39.2% and 30.9%,

respectively. The exception occurs with Belo Horizonte female cyclists who claim that their main motivation for starting and continuing cycling is that it is a healthier mode of transport.

The city of Belo Horizonte and Brazil as a whole have shown similar data regarding their main motivation for cycling – they consider bike use a healthier mode of transport (26.8% and 24.2%, respectively), a point of view also shared by Brazilian men in general and those born in BH (23.9% and 22.9%, respectively). When these results are compared, one can see that there is a big difference regarding the female cyclist in Belo Horizonte: for 45.6% of women born in BH, health is the main aspect that makes them start cycling, against 28.2% of the national average.

Again, the question of health calls attention in Belo Horizonte although the average in the State capital (32.7%) is not so different from the national average (25.9%). It is worth mentioning that 50% of female cyclists in BH continue cycling for health. For 28.6% of male cyclists in the State capital that is the main reason.

Other reasons have great influence on female cyclists in the national average (12.2%) but far less on female cyclists in BH (4.4%). Data are similar when we consider the average of Brazilians' male cyclists (10.3%) and their preference in BH (8.4%). The averages between Brazil and Belo Horizonte are similar (10.5% and 7.4%, respectively).

When we analyze the results in Table 1.4, some differences emerge when we look further into the difference between women and men's choices. Only 2.1% of the people who responded to the survey in Belo Horizonte continue cycling for environmental issues. In Brazil, the value is 3.4%. However, 5.9% of female cyclists in Belo Horizonte continue cycling for this reason, against 1.3% of male cyclists.

The lower cost of bicycle use is the main reason for 20.7% of the survey respondents in Belo Horizonte. For 23.3% of the men and 11.8%

of the women in BH, this is the key reason to continue cycling. However, the average is 17.7% in Brazil.

Data from tables 1.3 and 1.4 can be partially compared to cities around the world where investigation on the reasons why people start cycling are regularly conducted. Hérán notes (2014, p. 160, our translation) that female cyclists “prioritize convenience in their commuting mode”. Health, pleasure and low value¹⁹ are important reasons, in addition to the environmental concern, but according to a study carried out “by the website Copenhagenize.eu, only 1% of the inhabitants of Copenhagen use the bike primarily for environmental issues” (HÉRAN, 2014, p. 160, our translation).

Table 1.5 shows the cyclists’ opinion in relation to the problems they have to face, and Table 1.6 shows the results of the question: “What would make you cycle more?”. The survey shows that the barriers that prevent cyclists from cycling and what would make them cycle more are associated with lack of traffic safety and lack of respect on the part of motorized drivers, which are closely linked, and lack of cycling structure or its precariousness. Confirming this scenario, when asked what would make them cycle more, more than half of the female cyclists responded that with more cycling infrastructure they would use the bike more often, and almost a quarter responded that a safer traffic would also encourage them.

Highlights in favor of Belo Horizonte are: less than a third of people, compared to the overall numbers in the country, see public safety as an issue for the cyclist. In doing so, they challenge the common sense that the road is a dangerous place or, at least, they confirm that on top of the bicycle people feel safer than on foot, for example.

¹⁹ It should be pointed out that there is a difference between the initial cost of a bicycle (which can be high) and the cost to keep it in full operation (which, as a rule, is low).

	Lack of structure	Lack of respect on the part of motorized drivers	Lack of traffic safety	Lack of public safety	Lack of signaling	Other
National Survey on the Brazilian Cyclist Profile						
Brazil	26.6%	34.6%	22.7%	7.4%	3.3%	4.6%
Male	26.7%	34.7%	23.0%	7.0%	3.4%	4.8%
Female	26.4%	33.3%	21.8%	10.5%	3.0%	4.4%
BH	25.3%	29.8%	37.8%	2.1%	0.8%	2.9%
Male	26.7%	28.7%	39.3%	1.7%	0.7%	3%
Female	20.6%	26.8%	33.8%	4.4%	1.5%	2.9%

Table 1.5. Main problem to be faced – Belo Horizonte (2015). Source: Transporte Ativo (2015).

Another element assessed by the surveys that can be a limiting factor is the integration (performed and desired) with other modes of transport. Only 14.4% of the female cyclists of Belo Horizonte perform modal integration in comparison to the national average that is 26.4%, according to data from the national survey.

	More cycling infrastructure	More safety against robberies	More traffic safety	Better bicycle parking	Afforested streets and bike paths	Other
National Survey on the Brazilian Cyclist Profile						
Brazil	50%	11.8%	21.5%	5.9%	4.7%	5.7%
Male	49.5%	11.2%	22.1%	6.0%	5.8%	5.1%
Female	52.1%	15.1%	19.5%	4.9%	5.3%	2.9%
BH	52.7%	3.7%	29%	4.5%	4.3%	4.8%
Male	52.7%	3.3%	29.7%	5.0%	5.3%	4.3%
Female	55.9%	5.9%	27.9%	2.9%	2.9%	4.4%

Table 1.6. What would encourage the female cyclist to cycle more (2015). Source: Transporte Ativo (2015).

This is an aspect that is yet to be improved in Brazilian public policies, despite the emergence of bicycle-sharing systems and some isolated integration initiatives. In the European context, Frederic Hérán, in his book *Le Retour de la Bicyclette*, states that the integration of the bike with high capacity public transportation is especially convenient for regular routes” (HÉRAN, 2014, p. 180, our translation). This integration can occur with trains, buses or hitchhiking areas²⁰.

On the other hand, the survey entitled *Descobrimdo como #BHPedala* showed that there is a restrained demand in this respect in Belo Horizonte, when it reported that 91.9% of the female cyclists in Belo Horizonte responded they would use public transportation if they could cycle to the station. Related to this, Hérán (2014, p. 180) states that in the Netherlands 40% of people who use public transportation arrive at the stations riding their bicycles.

Final Considerations

One of the highlights of this text is that it was written in the heat of history, but perhaps this is also one of its limitations. It was written by six hands, who were immersed in the design of these surveys, sometimes in the implementation, sometimes in the analyses, or in both stages, and the reality of the bike in the city permeates it. Despite the diversity of professional profiles, many points in common unite us because we are part of the history of the insertion of the bicycle in the

²⁰ In European countries, it is usual to find parking areas where cyclists meet to plan their business trips, leisure trips, in addition to trips by car.

city, whether as actors of cycling policies²¹ or as members of the public administration.

The use of bicycles as a mode of transport has been growing in several cities around the world and in Brazil. The behavior of those who cycle in our country remains a field that needs to be further investigated, explored and analyzed. With data it is possible to subsidize the planning and execution of actions, as well as to conduct social control to promote the use of this non-polluting and healthy mode of transport and help transforming our cities into fairer, democratic and sustainable spaces, besides producing indicators and the corresponding historical series.

The main conclusions of the responses' cross-checks enable us to confirm the predominance of male (80.9%) cyclists over female cyclists, cycling more than 3 to 4 times a week, most of them with no high education and with incomes less than three minimum wages. They are new cyclists when compared to the national average and they started cycling when the city showed some signs of public policies in favor of the bicycle. The main reason for cycling is that this mode of transport is faster and more convenient, closely followed by its healthy nature.

As the three main issues still revolve around safety (lack of infrastructure, driver behavior and traffic safety) and the city still has a strong topography, it does not seem they are the main barriers to actual cycling. As public policies have not achieved the desirable and expected effect, it is worth asking: why, indeed, have these people started cycling in the last five years? One of the hypotheses we would like to explore, and is the main fact that took place in the city in recent years, is much

²¹ The term *cycling policies actor* was used intentionally to enlarge the vision of people who engage (voluntarily or not) in the formulation of policies for bicycles from the perspective of the civil society. It seeks to be wider than *cycle activist*, the term normally used.

more subjective than objective: the bicycle, in Belo Horizonte, is becoming visible, it is no longer a blind spot. The questioning by the press, the policies, the movements of local cyclists and the impact of national and international policies (especially the ones in São Paulo, from 2013 with the Mayor Fernando Haddad), all of them within easy reach of the Internet and social networks, are they not achieving the desirable effect of changing the culture? Are they not creating a new imaginary that will make people believe it is possible to cycle in BH?

The analyses in both surveys, even without exhausting them, bring about some conclusions and many new questions and ideas that will help us address the construction and the methodological development of future investigation in Belo Horizonte. The two surveys analyzed have high potential for further analyses, especially if we consider their distinct and complementary aspects. But, obviously, there are limitations to the interpretative application of each one of them.

There are some gaps in the themes of the questions, for example, why none of them recorded the ethnicity/race of the respondents? Would not the intention of “profiling” or “discovering how”, inherent in the surveys, be pretentious? None of the two surveys traced a complete profile of the people who cycle in Belo Horizonte, but certainly they contributed to this. Many are the limitations of interviews with those who are riding a bicycle and with those who are behind a computer. However, both methodologies can be replicated and with some data standardization in Brazil, the investigation on the cyclist profile can advance.

The article closes with a reflection on the challenges of the bicycle in Belo Horizonte. It seems clear that the bicycle has been winning a bigger space every day in this city. People who cycle, movements and other forms of social organization, companies and the public administration itself must, together, further address the few existing data about bike use in the city, exploring the possible paths and promoting urban

mobility policy in a systemic and transversal way that shall involve the overall related policies.

Although spaces of participation in planning and management processes still present many challenges, the civil society, in its many forms of organization and operation, has lately conquered a formerly innocuous space and has developed actions and projects that contributed to fostering the culture of bike use in Belo Horizonte as a mode of transport.

Aspects to be considered in the construction of a friendly, pleasant and safe city for the female cyclists are not only in books or knowledge restricted to technicians. It is extremely important that we take into account the results of research, as the two surveys that were addressed by this article, and that they be incorporated into multiple points of view with a wider and representative portion of the society that has started cycling or that has not.

Writing this article has allowed us to further understand that society, especially those who cycle or want to cycle, should be heard in depth, expressing their wishes, aspirations, priorities and values, so that the construction of the urban mobility policy by bicycle in Belo Horizonte becomes even more solid and follow in a tangential way the development and the review of the thematic plans (Master, Mobility, Demand Management, Supply Improvement, etc.) and other policies.

Although the contextualization of the local reality, carried out through the everyday experience of the people, plays a large role in the quality of the collaborative process, from conception until the approval of projects and policies, in Belo Horizonte, as it generally occurs in most of the cities in Brazil, much still remains to be done so that public policies can advance further and align with the wishes of those who have already chosen to use the bicycle as their mode of transport.

Such wishes, soon, will be transformed into demands that will go beyond the desire for creating new cycling structures, exclusive or not,

and the priority of bicycles in circulation. Before long, people who cycle in Belo Horizonte will want more streets with speeds compatible with human movement (creation of Zones 15, 20 and 30), reducing the amount of stops for cyclists (be at traffic lights or in the absence of priority at intersections), the improvement of the quality of road pavements in bike paths and streets, the creation of green waves for bicycles, among other measures that will give more comfort to those who are on top of the bike.

However, in this scenario of a great social movement and a continuous awareness on the part of the public management regarding bicycle mobility, for the next managements one imagines that the bicycle cannot be overlooked as a mode of transport since it has the following characteristics: "very little possibility of disturbance, 50 times less energy-consuming and 80 times more economical in its use of raw materials than a car "(HÉRAN, 2014, p. 201, our translation).

The expressive return and the continued bike use in Belo Horizonte also require, invariably, an affirmative policy of moderation of car circulation in the city. As Hérán states,

If some still claim that the policy [of restriction of the use of automobiles] leads to economic decline, the decline in which we live is enough to see that the opposite occurs: the slower cities, with its traffic calming, have no more economic hardships than others. A city with traffic calming is also an attractiveness factor (HÉRAN, 2014, p. 218, our translation).

When we reflect on the profile of the people who cycle in Belo Horizonte, from quantitative and explanatory elements about these people, we realize that probably the aspects that are encouraging them to cycle more are of a more subjective nature. But this bike's return to the central parts of the city, and in a broader territorially way, will not occur in a regular way.

The development of the use of this mode of transport will be crossed with advances and setbacks and will be unstable, having slower moments following faster developments. The process of resumption of the streets in Belo Horizonte will be like it occurred in every city that let cars occupy public spaces and expelled people and bicycles: slow, complex and with high and low moments.

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Chapter 2. Cyclists' Paths in Brasília/DF

Renata Florentino
Jonas Bertucci

Introduction

When we investigated the garages located in the Federal District (FD), we noted that the bicycle was the second most found vehicle (30.90%), followed by the motorcycle (6.04%). Cars are present in 66.13% of the households (CODEPLAN, 2013, p. 36). Even with the increasing motorization, bicycle ownership rate *per* household has remained stable for a long time, showing no variations for nearly a decade. Even with this significant value of bicycle ownership in DF, participation in commuting in 2009 was only 2.3% (PDTU, 2011), which shows a great potential for growth.

Since then, the FD governments have invested in cycling infrastructure, albeit without a clearly integrated vision of the bicycle as

a means of transportation. In parallel, even in places where there was no investment addressed to bicycle mobility, the number of cyclists has increased (RODAS DA PAZ, 2015, p. 34).

In this context, knowing the profile of who is making the choice for commuting by bicycle in the FD is of fundamental importance to support actions, whether promoted by society authorities or by the government itself, thus enabling the evaluation of what has been done and what remains to be done to facilitate this mode of active transportation.

This article sought to analyze the profile of people who have adopted the bicycle as a means of transportation in their daily life in the FD, from, primarily, the data of the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015). It discusses the motivations, demands, behavior and the assessment made by cyclists on traffic.

In addition to a perception of the cyclist's behavior from an individual point of view, it is important to understand the social and collective dynamics in which he/she is inserted. It is this wider vision that enables the development of induction mechanisms, so that more people effectively take the decision to use the bicycle.

Considering the goals of this study, it is important to highlight some specific urban features present in Brasília to analyze it in comparison with the other Brazilian capitals. The Federal District, nowadays called Brasília by the local government²², is a federate unit that more closely resembles a state than a municipality. What is known as Brasília for the rest of the country usually refers to the central neighborhood called *Plano Piloto* (Pilot Plan), where are located the seat of the Federal Government, of the Legislative and of the Judicial national public authorities.

²² Until 2014 the district government (*Distrito Federal* – DF) was officially called the *Governo do Distrito Federal* (GDF) [Government of the Federal District]. Since 2015 it has been called the Government of Brasília.

The locations in which the national survey on the Brazilian Cyclist Profile was conducted in Brasília, coupled with the characterization of the so-called Central, Intermediate and Peripheral Areas, expand beyond the Pilot Plan and involve the other FD administrative regions²³. Therefore, in this article we use the terms FD and Brasília synonymously to represent the same geographic and political region. It is worth remembering that the distances between the FD administrative regions are equivalent to what is considered a metropolitan region in other major cities.

In addition to the results of the national survey on the Brazilian Cyclist Profile in Brasília, other studies and surveys with data about the FD were used in a complementary way, as the *Pesquisa Distrital por Amostra de Domicílio* (PDAD) [District Level Household Sample Survey], *Plano Diretor de Transporte Urbano* (PDTU) [Urban Transportation Master Plan] and cyclist counts. In a few moments, we considered useful to observe the results in comparison with the results of other cities participating in the national survey on the Brazilian Cyclist Profile.

The survey results help to deconstruct both the imaginary and the stereotype that the cyclist in the city of Brasília would be an athlete, belonging to an elite class, showing that the profile of those who cycle in the FD reflects, to a large extent, the profile of its regular resident. Except for gender distribution (male cyclists predominate among cyclists across the country), age, income and education distributions of cyclists are similar enough to those of the general population.

Bicycle in contemporary cities

²³ In terms of urban management, the administrative regions of Brasília are similar to the sub-city halls of the municipality of São Paulo.

In the first decade of this century, as income and consumption in the lower purchasing power population highly increased, the use of the bicycle as means of transportation started losing ground in the country. The sale of bicycles decreased while the sale of motorcycles increased considerably. Coupled with lack of preventive measures, this scenario led to a sharp increase of deaths involving motorcyclists (SEGURADORA LÍDER, 2015)²⁴.

Issues such as violence in traffic, increase in traffic congestion, air pollution and urban stress have restored the bicycle to its position of an attractive alternative for many people in large cities. That choice does not seem to be motivated primarily by financial constraints (although the undeniable weight of the current crisis), but also by other factors, since the people who cycle in the large cities have become visibly diversified. Besides, there has been a growing demand for cycling infrastructure and for an urban redesign that will enable active transportation in a safe and comfortable way.

In this context, the bicycle has been rescued as an element of quality of urban life that makes possible the integration and inclusion of the population in the public space. As Hobsbawn highlights (2002), this feature of the bicycle was particularly noticeable before the cities changed as a result of the automobile popularization:

As cyclists move at the speed of human reactions and are not isolated from light, air, sounds and natural flavors behind windshield glasses, in the 30s, before the explosion of motorized traffic, there was no better way to explore a country of average dimensions with surprisingly varied and beautiful landscapes (HOBSEBWM, 2002, pp. 107-8).

²⁴ According to DPVAT (*Danos Pessoais Causados por Veículos Automotores de Via Terrestre*) data.

There are many possibilities to explain this scenario in which the resumption of cycling stands out. Actions to support and enhance this process are fundamental to meet the profile of people who started adopting this means of transportation in their daily life, their motivations and demands, behavior and their traffic assessment. This understanding is important both to meet the demands of the population that already uses the bicycle and to figure out how to encourage more people to make that choice.

Another relevant aspect in this discussion is the review of the nomenclatures used. It is essential to refine and update the terminology used when we discuss sustainable mobility so that speech and practice can be developed in a proper way to deal with the current issues on urban mobility. In the same way that the concept of pedestrian as one of the actors in traffic was only developed after the streets were taken by cars, it is important to understand that bicycle mobility also requires a whole new (and more appropriate) set of terms.

Currently, the *Código de Trânsito Brasileiro* (CTB) [Brazilian Traffic Code] refers to the bicycle in two ways. At one point, it is defined by denial, as “a non-motorized vehicle”. This first definition, which is the most commonly used, indicates that the bicycle is considered a second-rate vehicle, whose definition is given in comparison to the car, considered the protagonist motor. There is a clear limitation of the terms regarding a car-based vision of mobility, centered on the automobile²⁵.

²⁵ In a recently article published on *Folha de São Paulo*, Daniel Guth discusses this terminology. The author reminds us that even the buses are often considered “alternative modes of transport” in relation to the car, although being the main commuting motorized mode of the population. Available at: <<http://abicyclelanacidade.blogfolha.uol.com.br/2016/02/15/carros-vs-nao-carros>>. Accessed Oct. 17, 2016.

In a most appropriate way, CTB defines the bicycle as a human propulsion vehicle. In other words, such a definition is given for its own product features and not by the denial of something else. This is not a detail or some kind of exaggeration, but it is the appropriate recognition of this mode of transport and it can directly influence how public policies of mobility are performed. Therefore, when currently we discuss mobility on foot and by bicycle, the term “active transportation modes” has been increasingly used, characterized by the dynamic energy of its movement.

As important as properly defining the means of transportation is to qualify the events resulting from violence in traffic. It is much common to see that the term “accident” is used by traffic agencies and by the media to deal with traffic violations caused by reckless drivers. The use of the term “accident” trivializes criminal behavior and inhibits the search for the causes and liability of the occurrences. “Accident” is a fortuitous, unexpected event, which is extremely rare in traffic. In general, traffic deaths are phenomena that can be prevented and should be precisely named. Collision, overturning and running over are some of the terms that should be used more often in place of “accident”, as well as descriptions of the situation (such as sidewalk invasion), when there is not a single and specific word to denote it.

Survey sample characterization

In Brasília, after database processing, the final sample of the national survey on the Brazilian Cyclist Profile showed the participation of 422 cyclists (80.6% men). The final national sample totalized 5,012 cyclists, interviewed between August and September 2015 in ten cities from different regions: Aracaju, Belo Horizonte, Brasília, Porto Alegre, Manaus, Niterói, Recife, Rio de Janeiro, Salvador and São Paulo. Field research has been conducted with more than 100 researchers (six in the

FD). The national survey has established a minimum number of women (6%) and a minimum of public bicycles for each city (3.5%). The main methodological definitions of the survey included:

- Elaboration of a sampling plan, ensuring representativeness in relation to the population and comparability between cities;
- Conduction of interviews with people who use the bicycle at least once a week as a means of transportation, approached when they were cycling, pushing or parking their bicycles, always on workdays. This procedure results from the aim of the survey that addresses the cyclist who uses the bicycle as a means of transportation on a daily basis, since its use for leisure and sports is more common on weekends. Exceptionally, in Brasília, some interviews have been conducted on a weekend, during a local market that occurs periodically in a peripheral city, in which there is an intense use of the bicycle for mobility and trading;
- Equitable distribution of the interviews in the urban fabric by the central, intermediate and peripheral areas of each city (see Figure 2.1);
- The research coordination team in the FD, along with the team in São Paulo, drew up four additional questions, aiming to assess general conditions and safety conditions of routes, frequency of use of road structures and necessary improvements.

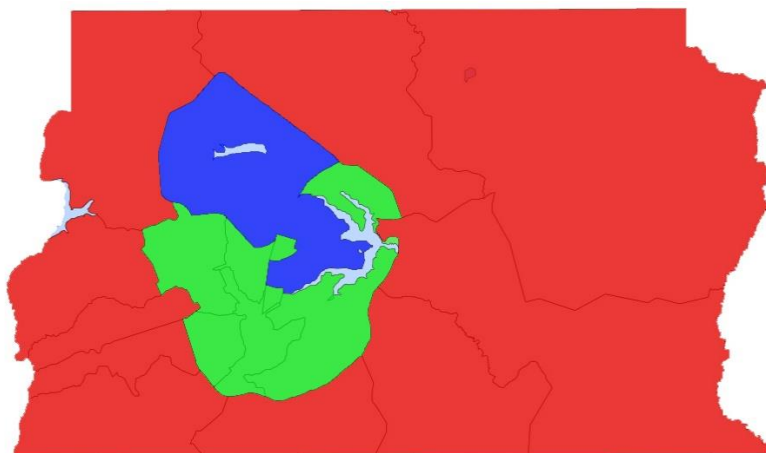


Figure 2.1. Central (blue), intermediate (green) and peripheral (red) areas considered for the survey in the FD.

Findings about the cyclist profile in the FD: what data analysis reveals

In this section, we discuss some of the main results of the survey in the FD and, when necessary, we analyze data taking into account results from other cities. The results of the analyses help to demystify some recurring affirmations about the reality of bike use in the FD and common-sense opinions which are often reproduced by the media and even by public managers, without factual confirmation.

General profile of respondents

Brasília's cyclist uses the bicycle as a means of transportation with a significant frequency, but this frequency is below the ones found in the other cities surveyed: 60% of respondents cycle 5 or more days per week. The second city with lower frequency of cyclists who use the bicycle 5 or more days per week is Porto Alegre, with 62.9%. Recife leads this indicator, with 89.6%.

In Brasília, about 74% of the respondents claimed to have been cycling for less than 5 years and 45% claimed to spend up to 20 minutes in their commuting routes. Regarding age, approximately 32.2% are in the age group of 25-34 years. Regarding schooling, most reported they had high school education (46.9%), followed by higher education (30.1%) and elementary school (19%).

Thus, we can already observe that the city offers a varied profile in which young people are the greatest majority compared to other cities. On average, cyclists reported an individual income of about two minimum wages. This is an audience that has recently begun cycling (possibly, in part, due to its young age), from mostly low-income families and cycles about 30 minutes, often using public transportation integration. The mean and standard deviation of the main variables of this general profile are listed in Table 2.1.

Variable	Mean	Standard deviation
How often do you use the bicycle as a means of transportation per week (days)	4.4	1.8
How long have you been cycling (years)	3.2	1.4
Travel time (minutes)	31.4	24.2
Age (years)	30.2	11.9

Table 2.1. Frequency and time of bike use, travel time and age. Mean and standard deviation. Source: National survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015). Elaborated by the authors.

Cyclist distribution according to schooling levels

For interpretation of data on schooling among the cyclists in Brasília, two cuts were made: one general cut considering income range (Chart 2.1) and another considering only people aged 25 years at least (Chart 2.2). As there is a significant participation of students both in the FD population, a total of 29% according to PDAD (CODEPLAN, 2013, p. 30) and between respondents (at least 43% uses the bicycle to go to school or College)²⁶, the second chart enables a separate analysis of the respondents that may have already completed their education.

Charts 2.1 and 2.2 indicate that the proportion of cyclists with higher education level drops as it moves away from downtown and approaches the periphery, and that the reverse occurs in relation to the proportion of cyclists with less schooling. It is important to remember that the area is defined by the location where the interview was conducted, not necessarily featuring the interviewee's household location. Still, distribution of schooling reflects the existing socio-spatial segregation in FD.

²⁶ In a cyclist count carried out in an urban route, in the neighborhood of Águas Claras, people in the age group of 12-18 years accounted for 16% of the overall cyclists counted (RODAS DA PAZ, 2015). In the neighborhood called *Estrutural*, this percentage was 13% (RODAS DA PAZ, 2016).

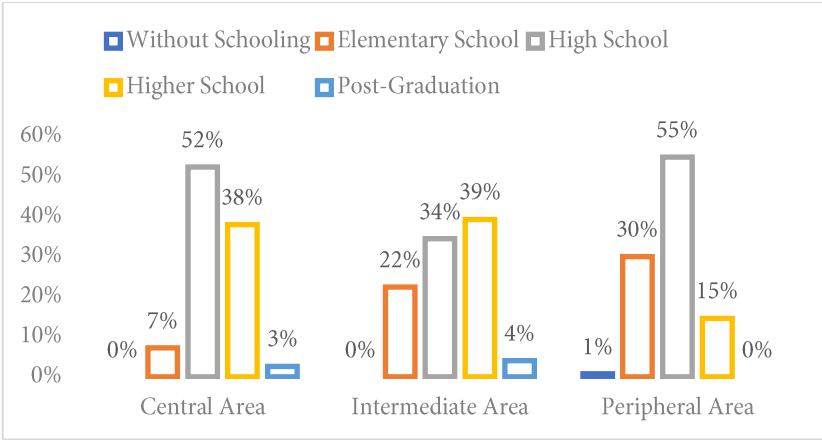


Chart 2.1. Schooling distribution according to the city Area (considered the last full schooling level). Source: National survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015). Elaborated by the authors.

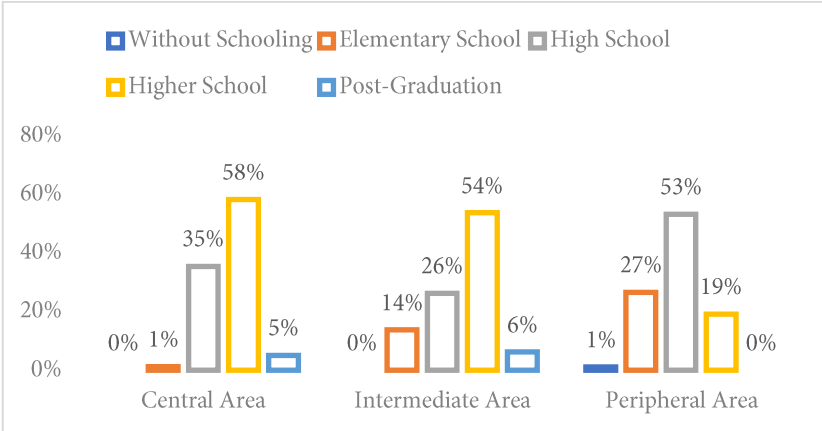


Chart 2.2. Schooling distribution according to the city Area (respondents aged 25 years and above) – considered the last full schooling level. Source: National survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015). Elaborated by the authors.

From the spatial analysis of employment in the various FD areas, the Pilot Plan has 47.7% of jobs supply (MIRAGAYA, 2013, p. 2). To get a complete picture of this concentration, the city that is second in the analysis (Taguatinga) has 9.0% of jobs positions. Given this, one can

infer that the cyclists inserted into the central area dynamics have probably access to better jobs and more education.

Cyclist distribution according to income ranges

In the FD, the individual income of the cyclist is above the average of the cities surveyed, and there is no large concentration in one range. While in the FD, 22.3% of cyclists are in the range between 1 to 2 minimum wages, in the other cities surveyed this percentage was 30.0%. As Chart 2.3 shows, 16.6% of the interviewees reported having no income and 15.4% declared incomes above 5 minimum wages.

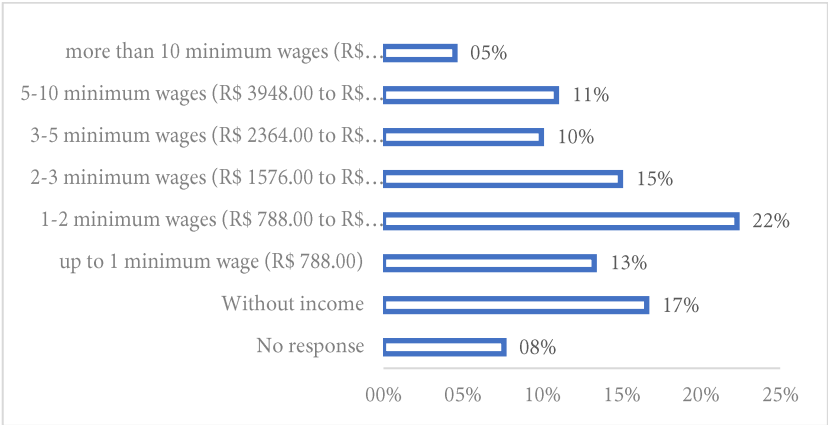


Chart 2.3. Percentage of cyclists in the FD according to income range in minimum wages (MW). Source: National survey on the Brazilian Cyclist Profile (TRANPORTE ATIVO, 2015). Elaborated by the authors.

Among the various occupations listed are masons, painters, gatekeepers, administrative assistants, security workers, and also salespeople, teachers, engineers and lawyers, in addition to many students. The survey shows that the bicycle is present in all classes and

social groups, predominantly in popular classes. We can do a comparison exercise of this result with the data available at PDAD (CODEPLAN, 2013) on the FD household income (Chart 2.4). Considering that the national survey on the Brazilian Cyclist Profile reports the individual income and not the family income, it is necessary, however, to be cautious because household income is expected to exceed individual income, since it considers the combined incomes of various people who dwell in the same place.

In PDAD (CODEPLAN, 2013), the highest class (of 10 MWs or more) is much higher (23%) than the one in the survey on the Brazilian Cyclist Profile (4.5%). In the group of up to 1 MW, the characterization of the FD households indicates 3%, while among the interviewed cyclists this percentage is 13.3%. It is also important to see the difference in the “without income” category, which appears with 16.5% among the respondent cyclists (including students and unemployed people), and was not listed in PDAD (CODEPLAN, 2013).

Data from the national survey on the Brazilian Cyclist Profile show a correlation between age and income, consistent with what is commonly observed in population analyses (Chart 2.5). The higher the age of the individual, the greater the income identified, with no clear difference in the intermediate income ranges, from 1 to 5 MWs.

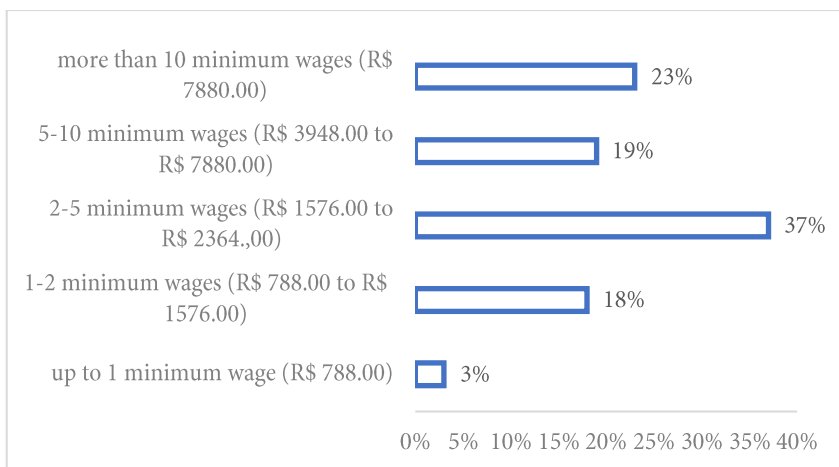


Chart 2.4. Occupied housing units distribution according to income classes – FD, 2013.
Source: PDAD (CODEPLAN, 2013).

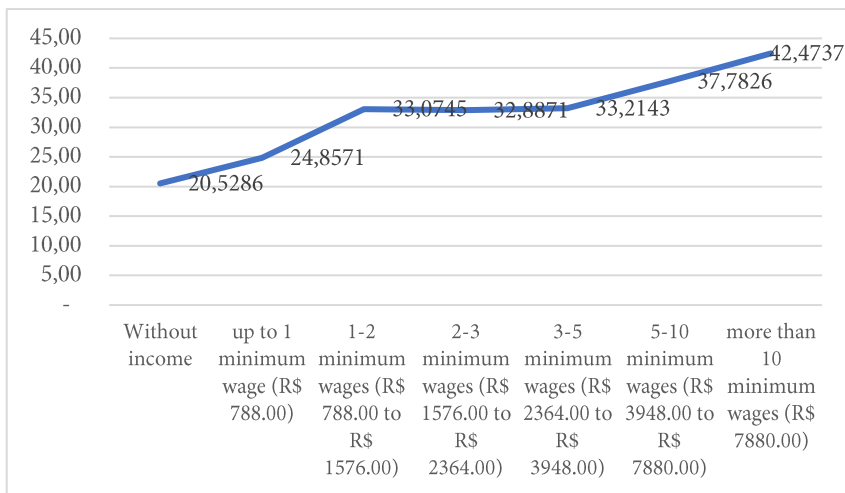


Chart 2.5. Mean age, according to income range, in minimum wages (MWs) The standard deviations of the means are, following the chart: 7.5; 11.1; 12.4; 9.2; 10.5; 10.5; 11.0. Source: National survey on the Brazilian Cyclist Profile (TRANPORTE ATIVO, 2015). Elaborated by the authors.

Average commuting time

Using the complementary questionnaire conducted in São Paulo (SP), it was possible to calculate information that is not easily available in Brazil, that is, the average speed of urban cyclists. In SP, respondents were asked, in addition to the time spent in their trips, about the distance covered in kilometers according to ranges. The cross-check of these two pieces of information enabled to estimate the cyclists' average speeds in São Paulo, according to the distance ranges travelled. The overall average was 15.2 km/h, and the average speed increases in accordance with the average distance travelled (Table 2.2).

Distance	Average speed
More than 10 km	25.8 km/h
7-10 km	16.3 km/h
5-7 km	14.3 km/h
2-5 km	10.7 km/h
Less than 2 km	3.7 km/h
General	15.2 km/h

Table 2.2. Average speed of the cyclist in São Paulo, according to distance ranges travelled²⁷. Source: National survey on the Brazilian Cyclist Profile (TRANPORTE ATIVO, 2015). Elaborated by the authors.

²⁷ * This value should not be compared to the mean in Table 2.1, because they are separate issues as the same person can use the bicycle for various purposes in the same week and on the same day, each with a different frequency.

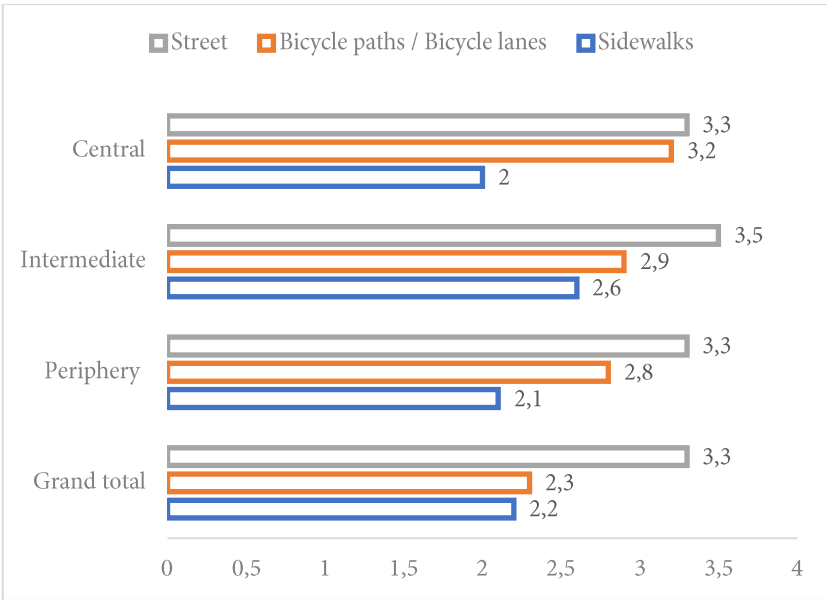


Chart 2.8. Means of frequency of bike use according to type of cycling structure. Source: National survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015). Elaborated by the authors.

This result suggests that a considerable part of the commuting needs of the population using the bicycle has not still been met by the current cycle road system. It also indicates that, despite the importance of bicycle paths and bicycle lanes, there is great need for traffic restraint measures, such as reduction of speed limits, and education and audit measures. These are measures that can help to ensure active mode access to all areas of the city, with safety on commuting and continuity of cycle routes.

Chart 2.9 shows that the person that has been cycling for less time tends to use cycling infrastructure such as a bicycle path and a bicycle lane in larger frequency (3.2 average). As the cyclist gains more experience and safety, he/she tends to use more the street itself for his/her commute, because he/she starts travelling longer distances and

accessing differentiated regions (the average drops to 2.8 starting at the 2-5 years range).

Female participation in bicycle use

As the research sample of the national survey on the Brazilian Cyclist Profile was set with a minimum number of women, it is not possible to analyze gender distribution in it²⁸. However, there is some research in Brasília that enables us to highlight some interesting aspects in this question.

We can notice that female participation in commuting by bicycle is still not significant in Brasília, however such participation strongly varies according to local infrastructure conditions. As we can see from data provided by the cyclist count that has been carried out since 2015 in the city, in the EPTG, a high speed and heavy traffic route, female participation was only 1%. On the other hand, in the cyclist count in *Ponte do Bragueto*, a bridge with no structure as well, this value has reached 6%. In Águas Claras, cyclists were counted in two locations, comprehending one in a local site without cycling structure, and another in the entrance/exit of a subway station. In the former, the number of women was 4% and, in the latter, it was 8% (RODAS DA PAZ, 2015). In *Cidade Estrutural* (Structural City), a low-income community, it reached 9% in long distance travel routes (high speed route) and 17% in the short and medium route distances (intern route, which gave access to a bus stop).

In that regard, we highlight the data in the *Relatório de Resultados da Avaliação do Serviço do Metrô DF* (2014) [Report of the Evaluation Results of the FD Subway Service], showing a significant participation of 30.5% of women among cyclists using this mode of transport

²⁸ In relation to gender, 80.6% declared to be men, 19.2% women and 0.2% (1 interviewee) declared “other”.

(METRÔ, FD, 2014). The results of these investigations strongly indicate that integration with public transportation encourages women to adopt bicycle use.

Going back to the national survey on the results of the Brazilian Cyclist Profile, the commuting time analysis did not indicate significant gender differences between Brasília’s cyclists, with time averages of 32.3 minutes for men and 31.3 minutes for women, $t(419) < 1$, $p = 0.84$. Regarding education, difference in gender was not significant, with a total of 82% of women and 80% of men who have at least completed high school (Chart 2.10).

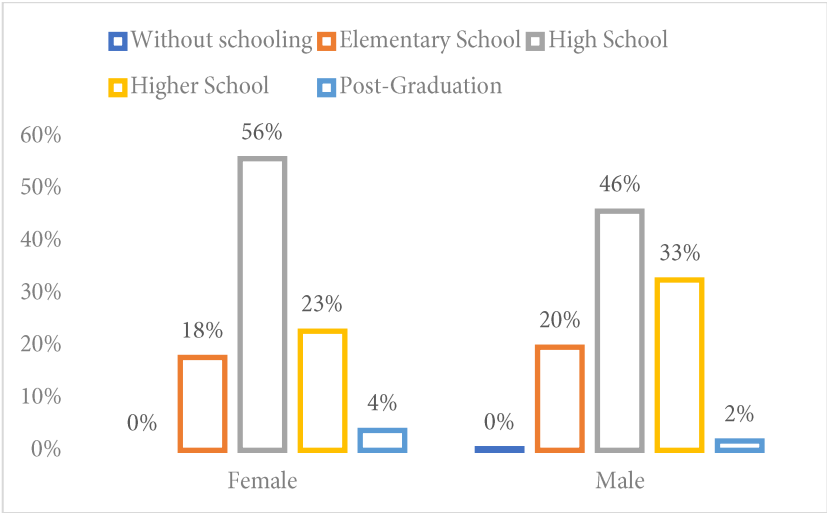


Chart 2.10. Schooling distribution according to gender. Source: National survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015). Elaborated by the authors.

On the other hand, as regards the amount of days cycled per week, there seems to be a significant difference, with mean of 4.5 for men and 4.0 for women, $t(421) < 1$, $p = 0.02$. Income distribution also indicates a larger concentration of women in lower income groups (Chart 2.11). These education and income results reinforce the hypothesis that the

cyclist's profile reflects, to some extent, the reality of the overall population. It is noteworthy, however, that the type of the survey sample planning does not allow accurate comparisons between men and women.

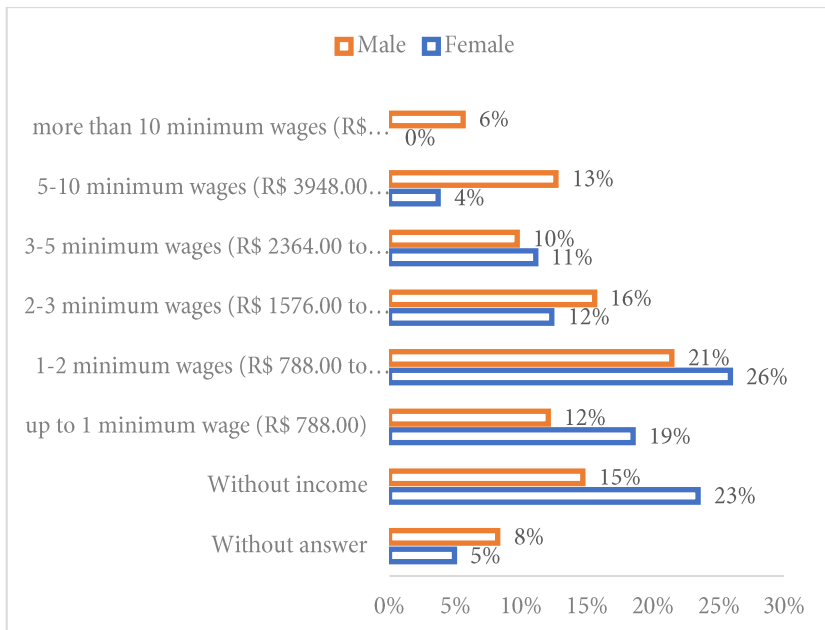


Chart 2.11. Income distribution according to gender. Source: National Survey on the Brazilian Cyclist Profile (TRANPORTE ATIVO, 2015). Elaborated by the authors.

Bicycle integration with public transport

Cycling associated with public transport is an important reality in the Federal District shared by 51.7% of the interviewed people, and the city shows the highest percentage among the other cities covered by the survey. This is most likely due to the fact that the Metrô-DF allows the

transportation of bicycles in the last train carriage, with no day or time restriction (District Law nº 4,216/2008), which facilitates and encourages the integrated use of these two modes.

From the database of a study carried out by *Companhia do Metropolitano do Distrito Federal* (METRÔ-DF) [Metropolitan Company of the Federal District], it was possible to draw a profile of the cyclists who use the FD Subway (METRÔ-DF, 2014), with their age, gender, accessibility, most metro stations used and the purpose of commutes carried out using the subway system. The report data, from 2014, indicate that 2.2% of those who use rail transportation daily (about 3000 people) arrive at stations by bicycle. Of these, 71.6% have the workplace as their commute destination, 12.6% the study location and 11.6% leisure and shopping activities locations.

Cycling to a subway station, besides being a gain of time for the user, also increases the area of rail transport. If there is a suitable structure, the option for the bicycle to reach a station can make a person starts using public transportation (either because walking would be too tiring or because commuting by bus would increase transportation cost). According to the investigation undertaken in the doctoral thesis of Mariana Paiva, most interviewees claimed that they would use the bicycle as a means of integration with the subway if there were better conditions of safety and road structure addressed to cycling as a mode of transport in the Federal District (PAIVA, 2013).

Motivations for cycling in the FD

It is usual to hear that cyclists are committed activists, citizens whose behavior is motivated by social and environmental concern. However, when reality is analyzed, a more complex picture emerges in the scenario. Environmental concern, for example, does not seem to be a deciding factor for a person to start cycling. Only 5% of respondents stated that this was a motivation for starting this practice. When they

are asked about their reasons to currently continue cycling, this value reaches 8.3%, indicating that the use of the bicycle can, over time, be slightly associated with the awakening of a greater environmental awareness²⁹.

In fact, the main reasons to start cycling in the FD are more connected to individual objective concerns than to collective concerns, such as health (32.5%), speed and convenience (30.3%) and, thirdly, economy of resources (21.6%). When analyzing the socio-economic and regional differences in the practice of active transportation in Brazil, Thiago Sá et al. help to clarify the question:

As one of the rare examples of inequalities in health in favor of the poorest, the inverse association between the practice of commuting to the workplace on foot or by bicycle and income level possibly reflects the budget constraint of the poorest families, the existing spatial segregation in Brazilian metropolises and public transport precariousness, and not necessarily a practice guided by social, environmental and health benefits. Spatial segregation, coupled with an inefficient public system transportation, contributes to an increase in commuting on foot and by bicycle as it increases the time required to reach the public transportation system and to make transfers within it (SÁ et al., 2016).

In fact, it is no big surprise that although speed and convenience are among the main reasons for a person to start cycling in the whole country, the FD showed the lowest percentage in this regard (36.5%) when the motivation for continuing cycling was asked. That is, if on the one hand people value the convenience of the bicycle after they start cycling, the comparison with other cities indicates that the perception

²⁹ For an analysis of the psychological barriers to responsible consumption focusing on environmental issues, see IGLESIAS, CALDAS and RABELO (2014).

of convenience on their commutes can improve. Discontinuity in infrastructure and lack of a planning through indicators of safety and demand throughout the history of the FD road cycle policies can be one of the explanations to this, which also creates barriers for the expansion of bicycle use³⁰.

That was the respondents' main complaint. Followed by the lack of cycling infrastructure (28.7%), lack of respect on the part of motorized drivers (22.7%) and lack of traffic safety were also mentioned (22.5%). According to the aggregated data for the ten cities, 26.6% report the lack of cycling infrastructure as the biggest issue of their day-to-day cycling reality, while 34.6% mention (lack of) traffic education. Interestingly, lack of infrastructure emerges as being more important than lack of education in traffic in Aracaju, Brasília, Rio de Janeiro and Niterói, cities which – apart from the latter – are perceived as Brazilian champions in implementation of bicycle paths.

The report entitled “*Planejamento Ciclovitário do DF: passado, presente e future*” [FD Cycle Planning: past, present and future], written by engineer Mônica Veloso (2015), helps to understand this apparent contradiction. It shows a rich background of the beginning of the debate on cycling policy in the FD, recording information on the first bicycle paths implemented in the FD (parts of bicycle paths in Varjão, Paranoá, Itapoã and Samambaia, resulting from joint initiatives by DER and *Rodas da Paz* in the first half of the 2000s). Data presented in Veloso's text (2015) highlight the imbalance in the following years between the definition of the locations where the cycling structure would be installed, the existing demand and the areas of greatest risk to cyclists.

We note that the supply of cycling structure from the *Pedala DF* program (2007) does not appear to have taken into consideration the existing statistics of demand and safety (observed in terms of

³⁰ To an in-depth discussion on the barriers to bicycle use for adults see, for example, Kienteka, Rech, Fermino and Reis (2012).

spatialization of occurrences), as the cities with the largest numbers of bike trips are not the same that received the highest mileage of designed bicycle paths. The Government of the Federal District, under the command of Agnelo Queiroz since 2011, has continued the program, claiming that the construction of bicycle paths aimed the reduction of cyclists' deaths in traffic, although its implementation ignored existing safety recommendations and statistics.

To allow a change in behavior, the implementing procedure of a new road structure requires a strategic planning involving not only the definition of where the main interventions will be made, but also the association with education and audit measures. As this has not occurred in the FD in recent years, it is not possible to automatically establish an association between the construction of many kilometers of bicycle paths and the apparent increase in bicycle use. As observed in the increasing bicycle use in locations such as *Ponte do Bragueto*, it appears that this has been a trend even where no increased infrastructure supply was implemented.

Final Considerations

There is room to expand bicycle use in Brasília under diverse aspects, both in the geographic and urban sense of road interventions that may facilitate the adoption of the bicycle as means of transportation, and in the sense of enhancing the frequency use among those people who have already made this choice. The results presented here allow us to deepen the reflection on the subject and can serve to assist the improvement of cycling mobility policies in the FD.

By revealing a large youth participation among the FD cyclists, who are usually students who still do not work, the survey reinforces the importance of ensuring better conditions of circulation in the surroundings of schools and colleges. In addition to the fact that these paths have already been much used, the possibility of having more access to places using bicycles gives greater commuting autonomy and

independence to the young population. It is also important to attract the young cyclists so that they do not migrate to more polluting modes that will greatly affect the urban environment as their income increases, making the option for bicycle use increasingly convenient and attractive.

Promoting convenience for everyone in cycling is a fundamental measure that demands both private initiative actions (for example, installing bicycle parking racks in companies, facilitating access to garages), and public authorities' actions (improving the continuity of travel routes through improvements in structure, signaling and lighting).

The high use of public transport associated with bicycle commuting indicates that it is important to develop and implement the surroundings of subway stations and BRT, creating an easy access to these bicycle points. This is crucial, especially when one assumes that this integration can expand the possibilities of women and encourage them to use their bicycles as a day-to-day mode of transport.

It is true that there was a time when cyclists claimed to the government to set policies for bike use in the city. Increasingly, it is the cities that need to encourage people to use sustainable means of transportation. After all, besides being an ideal means of transportation for urban centers, cycling brings about benefits even to that part of the population which, for whatever reason, will never cycle.

Furthermore, mobility public policies must be conducted in an integrated way with the use and occupation of the soil, articulated with improvements in conditions for pedestrian circulation and with discouraging measures addressed to individual car use. Education campaigns on a large scale and overt surveillance are essential so that the population will be able to well receive traffic restraint measures, such as reduction of speed limits, creation of Zones 30 (urban areas where the maximum speed is limited to 30 km/h) and streets for leisure, for example.

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Chapter 3. Bicycles in Manaus, Amazon (AM): production, uses and contradictions

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Geraldo Alves de Souza

Introduction

Manaus, capital of the State of Amazonas, is the largest city in the Northern region, and the seventh most populous city of Brazil. According to estimates from the *Instituto Brasileiro de Geografia e Estatística* (IBGE) [Brazilian Institute of Geography and Statistics], in 2015 its population exceeded 2 million inhabitants. It is a metropolis that has developed amidst the planet's largest rain forest which stands out due to its uniqueness in diversity of fauna and flora.

In view of its size and the condition of the unbridled development of its urban area, the capital faces problems like those of large world cities, in which urban mobility is highlighted mainly on account of its road system stasis and the lack of options regarding the alternative modes of transport.

However, there are some peculiarities to be emphasized regarding bicycle use and some characters associated with it: Manaus shows a profile of cyclists who often use it as a means of transportation, it is a city responsible for a considerable percentage of its industrial activity, with an urban governance with no active dialogue with any of the parties involved throughout its history and has neither ensured that that percentage would benefit its cyclist citizen nor society in general.

The questions to be asked are the following: what are the features of these characters? What could be the reasons for this lack of dialogue? What are the prospects for reversing the current condition?

In the first section, we present a contextualization of how the city of Manaus currently develops its public policies for urban mobility. Next, a description of the scenario of the local cyclist industry and its relevance to the city's economy. In the following section, we outline the cyclist profile in the city of Manaus (TRANSPORTE ATIVO, 2015). In the conclusion, we consider the general aspects regarding triangulations of the possible dialogue between the parties, and we present recent initiatives addressed to improvements in this matter.

Manaus and its current urban management

Urban mobility has become increasingly important to the life of millions of Brazilians, especially people who live in medium and large cities. Given this, the bike has been appointed as a sustainable means of transportation, cheap and accessible, enabling more efficient commuting in the urban setting.

The benefits provided by bicycle use are not only related to transportation. They also impact on a better quality of life and health, reduction of emissions of air and noise pollutants, reduction of impact on landscape and on territory aiming to occupy less urban space for commutes in an era of increasingly congested roads.

From the 1960s, with the implementation of the Free Zone and the Industrial Pole of Manaus, the city has started to develop a sharp economic and demographic growth. Associated with such growth, the demographic density of Manaus fell from 112 inhabitants per hectare in the early 1970s to less than 40 in the present day, according to the IBGE (2015).

In this way, the horizontal growth of the city following the economic growth led to a sharp decline in population density and placed it well below optimal levels for the establishment of urban economies, as pointed out by Silva (1998). Besides, as Souza argues (2015), this frantic growth, coupled with a decline in population density, caused considerable economic and environmental damage, imposing challenges to the transport of people and cargo in the urban territory.

The current situation of Manaus is similar to the situation in other Brazilian cities that developed at the same time and in places where urban sprawl occurred without proper planning in planning soil, roads or in the access to basic public services by a large part of the population.

In relation to urban mobility, Manaus is not different from other Brazilian metropolises, with issues and challenges related to traffic, land use and transport of people and cargo. But the Amazonian capital also has the potential to reverse this scenario and change the ways in which urban mobility policies are conducted, which will bring about beneficial results for everybody, cyclists or not.

As it happens in similar situations in the daily life of other cities with the same size, Manaus adopts an urban culture in which the car is the central element in road infrastructure planning. As a result, the city adapts itself to an idea of social values in which, according to Lefebvre (1991), the car makes itself available to a bourgeois class that holds the purchasing power, and, because of this, it is the recipient of direct and indirect privileges set up by public urban policies that will provide more and more free streets and parking lots. The symbiosis between the production of urban space and benefits and stimulus to the purchase and use of private cars in Brazil is widely analyzed by Vasconcellos (2014). We quote, as an example, free parking on public roads, control of fuel prices readjustment, tax exemptions, among others.

On the other hand, the bicycle (as a means of transportation) starts to have its use mainly associated with the lower social classes and their lower consumption power, which results in its segregation and

marginalization in the context of roadworks and, consequently, in its use in the public space.

The thesis of the car hierarchy in the social environment follows the individualistic mentality that those who have the object of consumption, of power, have a better position at that hierarchy, ignoring the other actors of the various modes of transport, such as those that occupy a more vulnerable position in that hierarchy, namely, pedestrians and cyclists.

As pedestrians and cyclists, the users of public space feel beaten, inferior and subordinate to the wild and aggressive rationale of traffic. Such rationale is manifested in brute force, in the power of speed (even when escaping or running is required), in the value, prestige and size of vehicles that, in Brazilians' way of thought in general [...] are the real owners (or bosses) of the traffic [...] (DAMATTA, VASCONCELLOS; PANDOLFI, 2010, p. 70).

This scenario needs to be changed since the social wear of the car value in relation to the pedestrian, cyclist and the user of public transport created a sort of privatization of the public road space. As a result, such "privatization" favored what is still a minority of users, and consequently will lead to more traffic disorders and traffic congestion. Given this, Schor (2007) emphasizes that the prioritization of the individual motorized modes of transport displays an urbanization that is reaching its limit – "a limit of space, time and health".

The social wear, caused by urban mobility policies as regards prioritization of car use, has caused a reaction of the local society mainly due to issues in urban mobility, allowing the creation of new paradigms for the segment. As new paradigms emerge before a crisis is well developed or has been explicitly recognized (KUHN, 1997), in the case of Manaus the crisis is in the omission towards the pedestrian and the cyclist, coupled with a precarious public transport.

In the case of Manaus, as already mentioned before, the urbanization of the city took place through the segregation of less favored social classes, pushing them to increasingly distant locations in areas farther south, from the edge of the old port.

The map below provides a better understanding of the local characteristics of urban development, more precisely of the city road system, where in blue are the routes with three or more rolling lanes in each direction, and in black are arterial stretches and collectors with up to two rolling lanes in each direction. To the South, bordered by *Rio Negro*, the city core, downtown, the starting point of Manaus urban development.



Figure 3.1. Manaus, AM - Letter-image of the main road system. Source: Landsat 5 TM RGB543, 08/31/2011.

From the analysis of the letter-image, we can note the scarcity of routes of large flow capacity. In addition, what stands out is the sinuosity of the greater part of the road system, the lack of parallel roads, as well as the existence of many insurmountable road stretches, mainly because of the rivers that cross the city and are locally called *igarapés*. These factors contribute to increasing distances, with a strong impact on the commutes made by bicycle. It can also be noticed that the central area is the best served by the road system.

Due to the characteristics highlighted above, most of the urban commutes are concentrated in a few urban roads, which hinders the movement of cyclists, given the lack of segregation and the disproportionate car speed.

Adding to the existing inappropriate road network, the urban mobility public policy still sees the car as a main vector. Such a policy continues to dedicate road works almost exclusively to individual motorized means of transportation, facilitating the idea of a modernized city through a traffic that will profit from the enlargement of roads, viaducts, avenues and bridges. In these terms:

Currently, what predominates in the city of Manaus are highways that propose the (ir)rationality of circulation through level crossings and viaducts, as an urban dimension that only seeks a solution in the technical area to the issues of a city marked by deep inequalities (OLIVEIRA, 2003, p. 18).

As a result of this model of public policy, both in the case of Manaus as in most cities, social inequalities are materialized in space. Social separation becomes spatial, with the predominance of greater mobility of the social classes with the maximum income standard. The creation of conditions for the migration from modes of transport to modes of commuting, as walking and cycling, becomes crucial to the

construction of fairer cities, with higher quality of life, a more efficient traffic and less emission of air pollutants.

In this perspective, the bicycle can be an important element of reorganization and reconfiguration of the urban space under a social perspective, in addition to being a vector of environmental improvement, regardless of any pre-existing conditions, adapting itself to the city, as it will be shown in this work.

Manaus, a producer of bicycles

Manaus is a metropolis of great proportions and its economy, which holds the sixth highest gross domestic product (GDP) among the cities in Brazil, has developed in cycles. The last cycle of this development began with the industrialization process implemented by the *Zona Franca de Manaus* (ZFM) [Manaus Free Zone], which still accounts for a large portion of the local economic development, direct and indirect, more precisely owing to the *Polo Industrial de Manaus* (PIM) [Industrial Pole of Manaus].

In the economic scenario, PIM is responsible for more than 20% of the national bicycle production, mostly concentrated on the bikes of highest aggregate value that were classified as bicycles addressed to urban mobility according to a recent study of *Rosenberg Associados* [Rosenberg Associates] (2015) that set the productive economic profile of the bicycle in Brazil.

Thus, besides the notorious bicycle benefits for the urban environment of the largest city in the Brazilian Amazon, specifically in the context of Manaus, this production is very important for the promotion of the local economy, particularly for industries of the bicycle sector, directly and indirectly. Accordingly, Manaus, more than other cities, has the potential for standing out in the country as a good example of implementation of policies addressed to bike use as means

of transportation. Besides being a metropolis with great capacity for cycling, it is also one of the main centers of bicycle production in Brazil.

From what is currently observed in Manaus, it is not much clear whether Manaus has reasons to bet on the bike. On the contrary, the city follows what predominates in other Brazilian cities and resists the adoption of bike commuting policies, insisting on public policies exclusively directed to private cars and public transportation by means of road transport. It ignores the new emerging possibilities of dealing with this issue and does not give much weight to the potentialities provided by a local cycling industrial pole.

Manaus, a bicycle consumer

Despite the absence of a bike path network and other measures to encourage the use of the bike as means of transportation, namely, calming traffic of motorized vehicles, specific education and awareness campaigns, the results of a survey on the use of bicycles in the city showed that Manaus has already an active cyclist on its streets.

Even with the overall issues, mostly related to traffic safety and lack of adequate infrastructure, these cyclists do not stop cycling. The survey that assessed the city cyclist profile in the Amazonian capital was conducted by *Associação Ciclistica Pedala Manaus* (ACPM) and nationally coordinated by the NGO *Transporte Ativo* (2015), in partnership with the *Observatório das Metrópoles* [Observatory of Metropolises] and the sustainable mobility laboratory of PROURB/*Universidade Federal do Rio de Janeiro* (UFRJ) [Federal University of Rio de Janeiro] in 2015.

In spite of the above findings, the results point to an already active cyclist riding on the streets of Manaus in his/her fight against issues mainly related to traffic safety and lack of adequate infrastructure. However, this current situation can be minimized with education

policies and implementation of bike paths, bike lanes, bike routes and traffic calming areas.

The survey raised the key challenges faced by those who use the bike as means of transportation in Manaus, as shown in Chart 3.1 below.

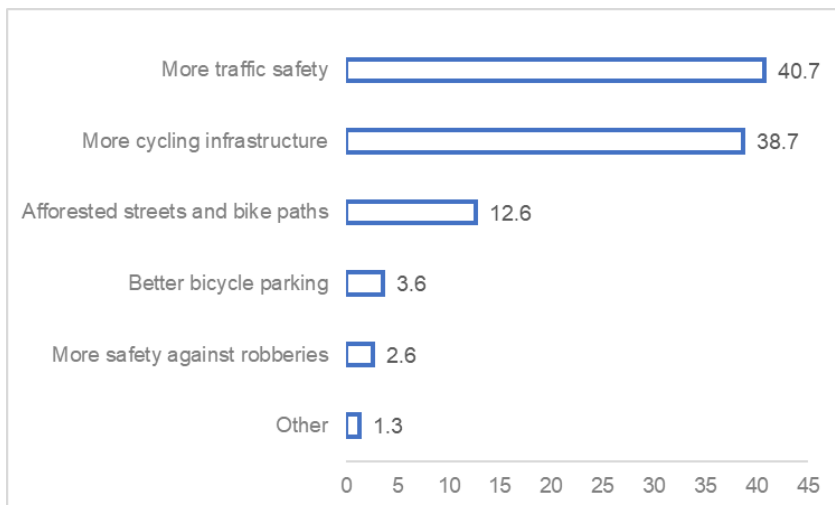


Chart 3.1. S Main problem faced in the use of the bicycle as means of transportation in Manaus. Source: National survey on the Brazilian Cyclist Profile, 2015.

As it can be noted, for 46.4% of the interviewed cyclists, lack of respect on the part of drivers is the main problem faced, followed by lack of traffic safety, with 28.5% and lack of adequate infrastructure, with 20.2%. It is possible to conclude by the chart below that the main issues concern the act of circulating (car drivers' behavior, traffic safety) and lack of investments in the sector, such as the construction of an environment addressed to safe bike parking in public institutions, in public places and in private companies. This latter aspect stands out in the next chart.

The chart below lists the motivations that would make the interviewed cyclists cycle more. Among the measures, the need for specific public policies addressed to the use of bicycles stands out, which led the respondents to highlight the need for more traffic safety (40.7%) and cycling structure (38.7%). These vectors are also important in other cities for a better and more efficient inclusion of the bicycle as a means of transportation.

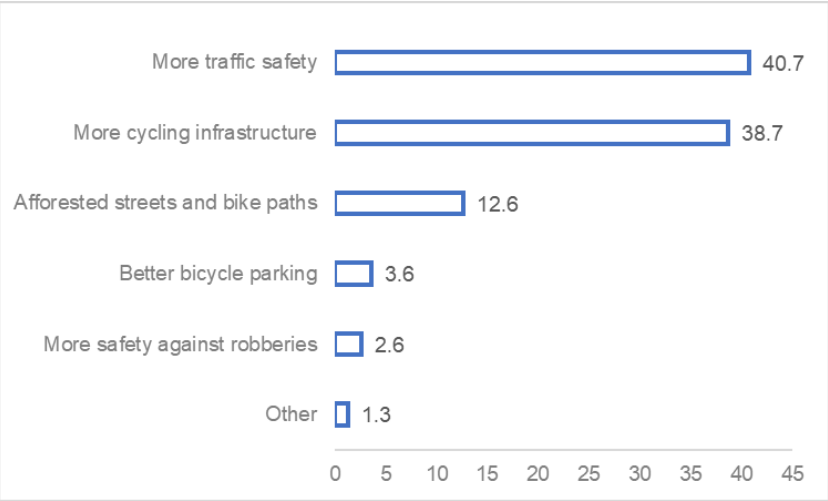


Chart 3.2. What would make you cycle more? Source: National survey on the Brazilian Cyclist Profile, 2015.

On the other hand, it is important to highlight that the city lacks infrastructure directed to bicycle use, with less than ten kilometers of bicycle paths and bicycle lanes already installed. It seems important to establish a comparison with other cities of the same region and the same size of Manaus. Belém’s bike path network in the State of Pará has more than 80 kilometers already implemented. In other capitals of the Northern region (of smaller size and investment capacity), namely, Rio

Branco in the state of Acre, and Boa Vista in the state of Roraima, there is more space for bicycle use than in Manaus.

Manaus shows a history of many attempts to create campaigns for education in traffic addressed to the cyclists' safety, but no specific campaign was carried out addressed primarily to the other actors involved, with the promotion and inclusion of the bicycle on the streets. Thus, the campaigns presented a general vision, targeting the wellbeing of the population and the cyclist's own security, focusing on the safety equipment, such as helmet use, for example.

In the city, educational campaigns were conducted by civil society organizations, in partnership with the private sector, assuming the role of inserting the bicycle in the local context. Courses and lectures were carried out as, for example, the program *Convivência Legal*, set up by the cyclist association called *Pedala Manaus* in partnership with bus and taxi companies and government bodies that deal with the city traffic, whose goal is to make drivers realize how important is to adopt measures for the safety and protection of cyclists – the most fragile party when traffic accidents occur. The results are excellent, but insufficient.

Another important matter is the policy of traffic calming, especially in residential neighborhoods, so that they become safer and attractive to cyclists and pedestrians. But this is not what happens in Manaus. On the contrary, since April 2015 the city has not had speed monitoring equipment. Without this equipment, speeding is not identified, and drivers are not punished. Other mechanisms to enforce speed reduction on the part of drivers (such as the spine road, implemented across the flow of vehicles) are little used in Manaus.

Despite these issues, especially regarding traffic safety and lack of cycling infrastructure, the aforementioned survey revealed that a good portion of respondents has been using the bicycle for a long time already, as shown in the chart below.

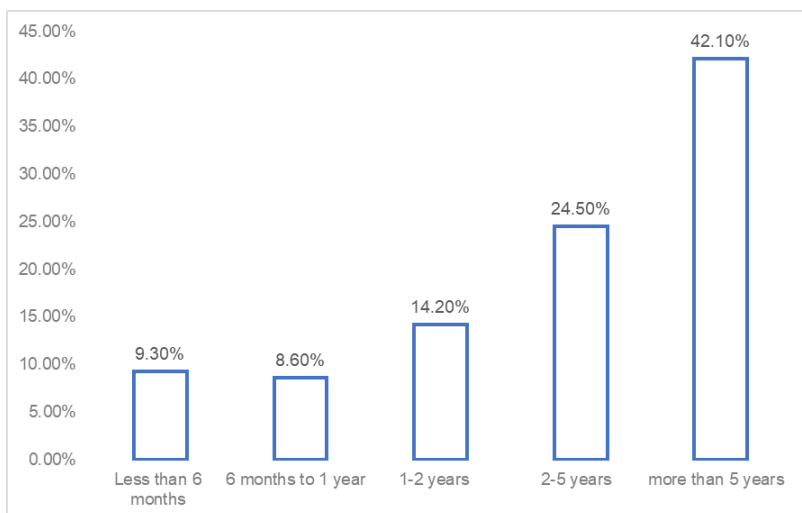


Chart 3.3. How long have you been using the bicycle as means of transportation in Manaus? Source: National survey on the Brazilian Cyclist Profile, 2015.

When analyzing data on the time of bike use as means of transportation, the minority of new cyclists, up to 1 year of use, cite the local government inertia in the establishment of incentives that will ensure bike use as a means of transportation, whether by the lack of a bicycle path network, or by bicycle-sharing systems, bicycle parking racks, among other factors.

The regularity of bike use as means of transportation in Manaus is confirmed by the results of bicycle usage data by day of the week, where the response of most interviewees (35.1%) was that they use it in the overall 7 days of the week, followed by 6 days a week (22.8%), and the bicycle predominated as the main and usual means of transportation.

Data released by the IBGE (2015) show that the rate of population growth of Manaus since 2010 has been higher than 25% per year. Data disclosed by the *Oficina consultores* on the number of passengers carried by public transport in Manaus revealed its stagnation since it still shows the same numbers as in the past, namely 22 million of trips

per month. When we compare those data to Chart 3.3, we come to the conclusion that because of population growth, or of modal migration, bicycle use has increased in recent years. Regularity of bicycle use as means of transportation in Manaus throughout the week is shown below by Chart 3.4.

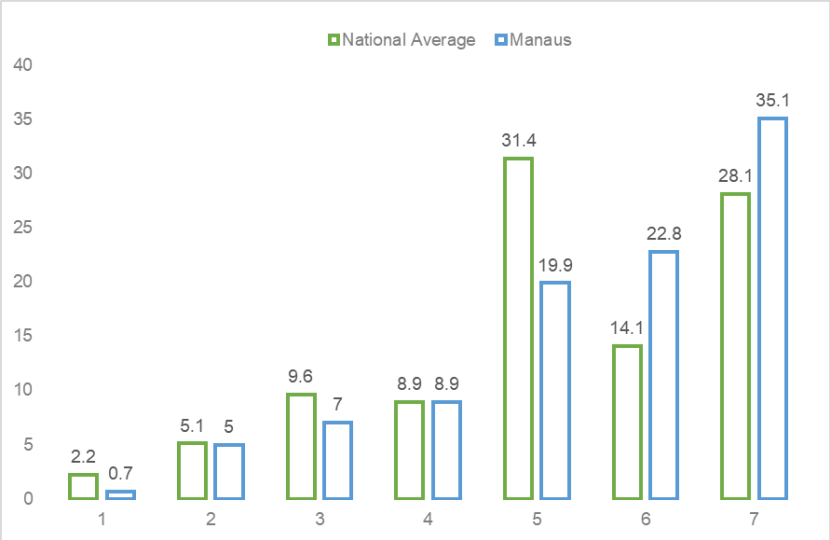


Chart 3.4. Comparison of bicycle use Manaus/National average. Source: National survey on the Brazilian Cyclist Profile, 2015.

As it can be noticed, most respondents (35.1%) stated they use the bike every day of the week and 22.8% stated they use it 6 days. This result is above the national average that had the highest index in 5 days a week (31.4%), followed by 6 and 7, with 28.1% and 14.1%, respectively.

Despite the inertia of public policies regarding cycling mobility in Manaus, data showed that most of the interviewees (42.1%) have been using the bike for more than five years, and on all days of the week (35.1%). Given this, it can be concluded that cyclists seem to be

invisible, that is, they exist, but are not seen by public policies. It can also be inferred that there is a restrained demand waiting for improvements on the conditions of movement so that bicycle use can be intensified in Manaus. Despite the common sense of associating bike use just for short commutes, data presented in the survey indicate that the most frequent commutes are of medium and long duration, as shown by Chart 3.5.

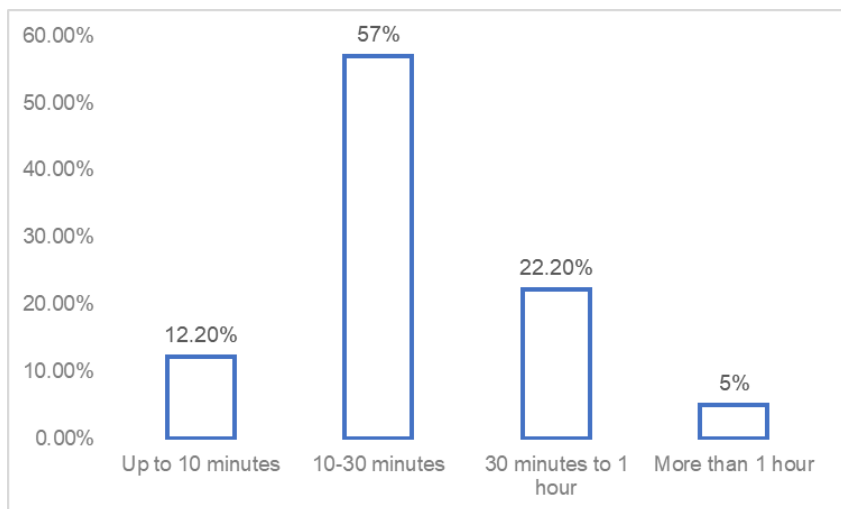


Chart 3.5. Time spent in the most frequent travel route. Source: National survey on the Brazilian Cyclist Profile, 2015.

As noted, the majority of responses concerning travel duration is 10 to 30 minutes (57.0%), followed by 30 minutes up to 1 hour (22.2%). The shorter commutes (up to 10 minutes) reached only 12.2%. Assuming that the average speed of a cyclist in urban areas is about 15 kilometers per hour, it is concluded that most urban bike trips reach travel distances over ten kilometers. The survey also raised the age range of bicycle users in Manaus, as shown in Chart 3.6.

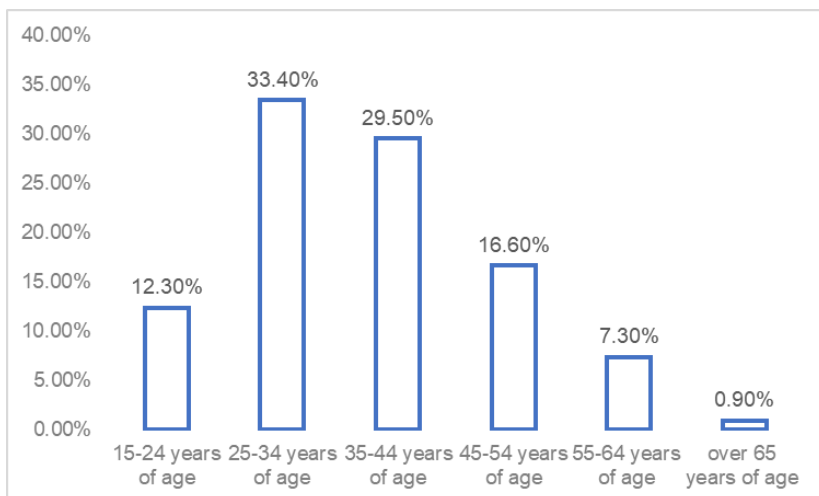


Chart 3.6. Age range of bicycle use as a means of transportation in Manaus.
Source: National survey on the Brazilian Cyclist Profile, 2015.

For most cyclists in Manaus, cycling starts since their emancipation, as shown in the chart data above. The low bike use by the younger population (15-24 years of age) can be assigned to traffic safety as this population do not often have their parents' endorsement and encouragement. The economic factor was also raised by the survey and is shown in Chart 3.7.

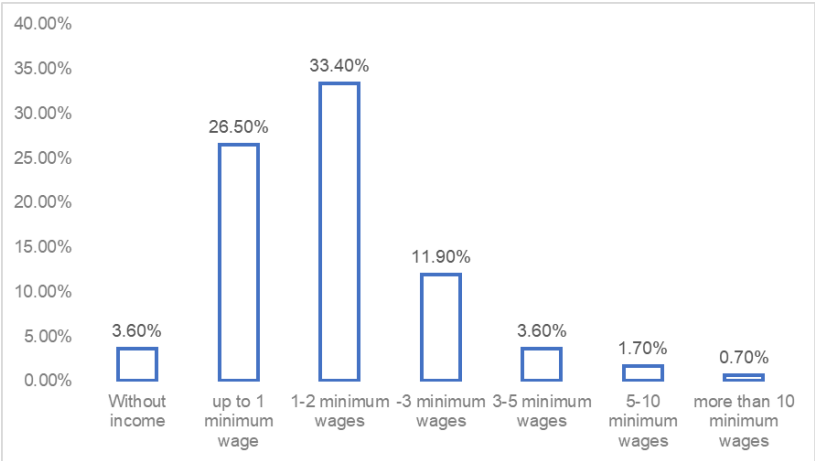


Chart 3.7. Income of interviewed cyclists. Source: National survey on the Brazilian Cyclist Profile, 2015.

It can be concluded that most cyclists have low purchase power, i.e.: monthly income ranging between one and two minimum wages. The income indicator adds to the cyclists’ schooling, as shown in Chart 3.8 below.

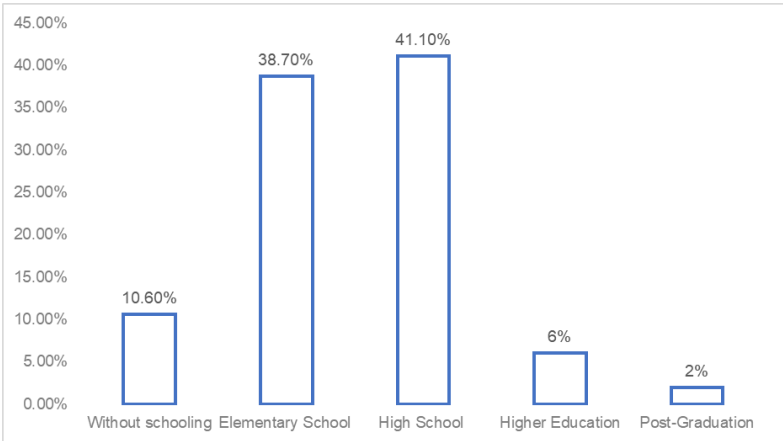


Chart 3.8. Schooling (according to the last full segment). Source: National survey on the Brazilian Cyclist Profile, 2015.

Most respondents indicated schooling until high school (41.1%), followed by those whose schooling was up to elementary school (38.7%) and those without schooling (10.6%), which possibly indicates a characteristic of self-employment of the less favored classes in the current context. Of those who responded to have completed higher education and post-graduation, the total amount does not reach 9%.

Data of the last two charts make it clear that the bicycle is used predominantly for commutes between the home and the workplace, denying the idea that it is used for leisure. They also lead to the conclusion that users of the bicycle as a means of transportation in Manaus are those of the economically less favored classes and with low schooling, who have been historically excluded from urbanization and urban mobility public policies.

It cannot be concluded that the higher purchasing power classes are not interested in migrating to the bicycle as a means of transportation, accompanying the advantages brought by convenience and quality of life. The results of Manaus in the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015) and his/her main motivations for starting (and continuing) using the bike in his/her urban trips are shown in Chart 3.9.

Analyzing the above chart, it is possible to conclude that there is a restrained demand waiting for conditions to use the bicycle. In a scenario of constant traffic congestion, the bike emerges as a more convenient and faster way to arrive at desired destinations. It can be assumed, however, that people do not use the bicycle because of lack of safety in the road system. Thus, it is no longer a demand only of the periphery, but of the entire city. The point of inflection of the curve is, therefore, in the conquest of safe conditions for all those who want to make the bicycle their means of transportation.

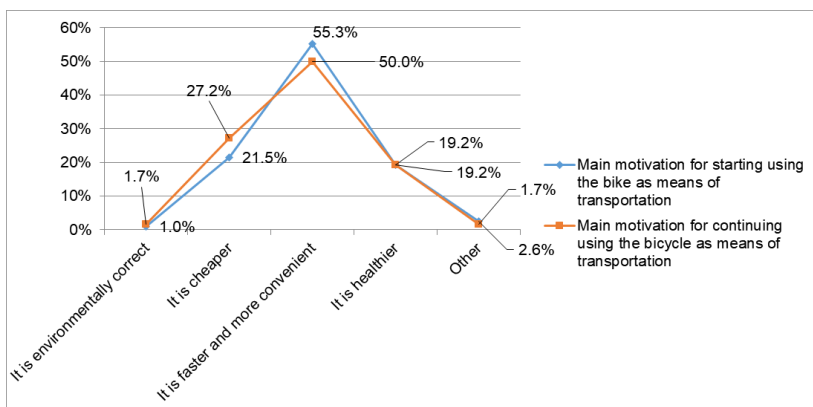


Chart 3.9. Comparison between the main motivations for starting and for continuing using the bicycle as means of transportation. Source: National survey on the Brazilian Cyclist Profile, 2015.

It turns out that there is a slight reversal in changing the percentages when we compare the two motivations, “it is cheaper” and “it is faster and convenient” in the two moments of motivation, motivation for starting using the bicycle (blue line) and for persisting in its use (orange line). Speed and convenience of use are the biggest motivations, followed by low cost. That is, from the moment that one starts using the bicycle as a means of transportation its low cost becomes the most important factor than it was before migration. Certainly, the concept of low cost is understood when we compare the bicycle to the other means of transportation. Low cost refers to maintenance, parking expenses, taxes, among others. In summary, the cyclist realizes how cheap it is to use the bicycle as the main mode of transport.

Other data raised by the cyclist profile of Manaus relate to the very low percentage of integrated bike trips with other means of transportation. Only 0.7% of respondents perform intermodality. This result falls far short of the national average, which is 26.4% (TRANSPORTE ATIVO, 2015).

As regards intermodality, national results show that integration or intermodality crucially depends on the type of the collective means of transportation available in each city. In cities that have a system of medium or large capacity (subway, for example), intermodality is greater.

In the local context, it turns out that 98.3% of the interviewed cyclists cycle all along the travel routes demonstrating, in the analysis with other indicators, that though 22.2% of travel routes last from 30 min up to 1h, the bicycle is still more efficient and less costly than the combined use with public transportation.

It is important to highlight that the bicycle is used in Manaus predominantly to go to work (97.4%). Comparing the income of most users, we can infer they are self-employed professionals who do not rely on subsidies to use the city public transport system. Thus, using the bicycle is a way to avoid spending money on public transportation.

Bicycle commuting is possible

Based on the assumptions of viability of cycling mobility in Manaus, which would be the reasons for inaction in implementing specific public policies addressed to cycling mobility? Regarding this question, next will be presented some of the points used by public authorities and later replicated by public opinion:

- The city was not planned for bike use;
- Lack of financial resources to implement policies encouraging bike use in Manaus;
- The tropical wet climate (with warm and rainy days most of the year) is not suitable for regular bike use.

Many of the arguments above are easily challenged by a simple comparison between Manaus and other cities and with studies that have already been performed and widely released on this topic.

As to an allegedly lack of city planning, it is argued that no city is born ready, fully planned. Cities result from local context, physical, economic and social boundaries for implementation of public works, private investments, social achievements, among others. As a rule, a minority of technicians and politicians have the power to define and direct public policies of any kind. The low participation of society, resulting from this kind of governance, has limited the benefits addressed to the less favored social classes, such as those that use cycling and walking as resources for their urban trips.

As to an allegedly lack of resources for implementation of works intended for the bicycle, the same logic presented earlier can be used, that is, the discretionary choice of the public administration. One can even argue that public works dedicated to bike use require less resources than those dedicated to the motorized individual transport. Besides, there is the possibility of searching for funding sources exclusively intended to cycling works.

With regard to the climate of Manaus, it is worth highlighting the data from *Oficina Consultores* in the preliminary report of *Plano de Mobilidade Urbana* (PlanMob) [Urban Mobility Plan] (PREFEITURA DE MANAUS, 2015). Only a total of 2.9% of respondents presented “comfort” as a factor of constraints for bike use. This is well below the other factors, such as lack of safety (35.7%) and lack of bicycle paths (32.9%).

Complementing such understanding, when we compare the influence climate has on the cyclist to the influence it has on users of other means of transportation, we draw the conclusion that the comfort level of cyclists is not as harmful as that of users of public transport. The latter face temperatures up to 45°C inside of vehicles and the population that walks face temperatures a little below that. Only a portion of the users of private cars enjoy a suitable thermal comfort, at a much higher

cost. Investments in afforestation of public roads would bring amenities to all people who live and circulate in the city. Manaus could implement this since, after all, it is a great city in the heart of the largest rainforest on the planet.

One demystifies the most used reasons for endorsing the lack of effective policies aimed at bicycle use as a mode of transport, reiterating its total viability as state policies in the Amazonian capital.

Due to their importance, highlights are the attempts already initiated aiming to encourage effective policies to bike use in Manaus. An example is the law project #218 of 2013 (PREFEITURA DE MANAUS, 2013) which aimed to set up the bicycle as a regular transport mode in Manaus, with allocation of a percentage of urban roads for the construction of bicycle paths and bicycle lanes in a functional model, construction of bicycle parking racks at public transport terminals, in public buildings of the municipal, state and federal spheres, squares and public parks, in schools, among other places.

This bill had an important provision as it set up a period of 270 days in which the municipal government would have to present studies for implementation of the works. Resources for the implementation would be from the municipal budget and the *Fundo Nacional de Segurança e Educação de Trânsito* [National Fund for Security and Traffic Education] and from resources derived from urban traffic violations. The civil society recognized the real needs of the measures proposed by the project that was discussed and approved by the *Câmara Municipal de Manaus* [Municipal Council of Manaus]. However, it was vetoed in full by the Mayor, claiming invasion of administrative and budget competence.

The portion of society that fights for public policies addressed to improve the cycling conditions for those who regularly use the bicycle in Manaus saw a new opportunity for them in PlanMob. During the process of the drafting of the bill, many attempts at dialogue were made with the team responsible for its drafting and in different times of

debate at the Municipal Council. The PlanMob is contained in the Municipal Law Nº. 2075 of 2015 (PREFEITURA DE MANAUS, 2015). In its analysis, it can be observed that the plan did not acknowledge how important it would be for the city if the municipal government promoted bike use as an effective means of transportation. On the contrary, it only envisages the bicycle as a means of transportation that is playful and complementary to the other means of transportation for short and medium commuting distances.

At this point, one can note how PlanMob is away from the reality of cycling mobility in Manaus, given that, according to the results of the aforementioned survey, the bicycle is used effectively as a means of transportation for medium and long commuting distances, besides the fact that part of commutes carried out by bicycle have as target the places of work and study. Sports and leisure remain in the background.

Despite the importance as a support to bicycle users, the lack of bicycle parking racks and paracycles is a common issue among cyclists from all over the country and in Manaus, where the municipal urban mobility plan has shown no progress on this topic.

With the full dialogue between the parties, the public administration, the private sector and the civil society, cycling mobility policies in Manaus are viable and have full possibilities of effectiveness and efficiency.

Final Considerations

As the above, from the analysis of the results raised in Manaus by the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015), one can note an effective use of the bicycle as means of transportation, mainly on account of its time of use (most of the interviewed cyclists have been using the bike for more than 5 years), commuting time (most travel routes are from 10 minutes to 1 hour) and frequency of weekly use (6-7 days a week).

Despite the undeniable benefits brought by cycling to its users and to the environment, the city has not positively responded to its promotion and encouragement. The common sense of a portion of society, and especially of public managers, gives to it a supporting role in the chain of means of transportation, reversing the logic of prioritizing public policies for urban mobility.

In this way, the bicycle in Manaus, just like other active modes of transportation, is still seen as an item of minor importance in the city's everyday life, as a means of transportation directed to the less favored classes, as a need of transport for those who cannot afford to purchase a car.

Conversely, the car became increasingly incorporated into daily life, transforming the customs, culture, which led the society of Manaus to see it as a symbol of glamor, in such a way that this directly interfered, through capital, in the current construction of the city.

This competition between cars and bicycles for the space of circulation of the city reveals the existing disparity in consumer society, apprehended in the patterns of consumption, land use, transport and, above all, in the measures of the public power in the cities.

One also notes, by analyzing the patterns present in Manaus, in its bicycle production by the Free Zone and in its feasibility for being implemented as a regular mode of transport (associated with a profile of cyclists who regularly use the bicycle as a means of transportation), a restrained demand. In such a context, it is up to the local government to design measures to encourage and value bicycle commuting.

As Harvey (2004) pointed out, it is necessary to fight so that Manaus can create public policies that will prioritize the so-called active transportation (walking and cycling), thus exercising equality in the urban design, in the use of spaces and in the promotion of a more humane, just and sustainable city. It is necessary to work to accomplish this.

With a clear disparity on induction and use (due to purchasing power or use availability), car and bicycle users eventually portray

inequality in the use of the urban space, a space marked by privileges for those with best financial and consumption conditions. This becomes a feature of car dependence and, in opposite, the marginalization of the bicycle.

Finally, we suggest a greater dialogue between the three main actors involved, namely, the private sector (including the ZFM industries), cyclists and public authorities, so that they can implement efficient and beneficial proposals not only to those involved, but also to the overall inhabitants of Manaus.

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Chapter 4. Cycling mobility: convergence between the urban and tourism

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Introduction

Encouraging cycling mobility in Brazil is an integral part of the *Política Nacional de Mobilidade Urbana* [National Policy of Urban Mobility] (BRASIL, 2012) guidelines and, according to the global trends pointed out by Johnson and Bonham (2015) and Mason et al. (2015), there will be a (re)signification of bike use in the territories and those “new uses” will act as catalysts for urban requalification processes and improvement in the cities’ quality of life.

Thus, investments in the development of public policies favorable to bike use in the country (FLORES et al., 2015) promotes both the urban mobility system (MACÁRIO, 2011) and the development of sustainable tourism (DICKINSON et al., 2011; GROUS, 2011). In addition, the study conducted by Pucher et al. (2010) indicates that the increased bike use in the cities produce benefits for the economy and public health that largely exceed the risks of traffic accidents, contrary to the misperception that it is directly associated with the greatest number of accidents.

Within this context, the bicycle emerges both as a flexible tool of multiple potential uses - promoter of mobility and access to the city,

and of local economic development (DEFFNER et al., 2012). So, the intrinsic relationship between bicycle, mobility and tourism (JOHNSON; BONHAM, 2015) stands out, but is little understood in Brazil. However, for an understanding of this relationship it is essential to conduct periodic national surveys, so they can support the decision-making process by public managers about the investments and actions necessary for the promotion of bicycle mobility in Brazilian cities (HANDY et al., 2014; PROVIDELO; SANCHES, 2010).

Despite recent advances in the adoption of cycling-inclusive policies, the existing precariousness of national data still is a barrier to the use of the many benefits resulting from cycling (BRASIL, 2007; 2012). Data, in general, are restricted to modal division and to bike path network length. The former relates to the proportion of bike use as the main mode of transport by the inhabitants. Its upgrade is done every 10 years through surveys of the origin-destination type, but still they do not cover all existing municipalities in the country (ANTP, 2015). The latter assumes the city has already an infrastructure for the cyclist but does not distinguish the types of routes (bicycle path, bicycle lane, shared road) and the connectivity of the bike path network to the urban mobility system. Given the distinct reality of Brazilian municipalities in relation to cycling planning, this datum is even more sensitive to irregularities. Although being still insufficient as regards the multiple potential of the use of bicycles, data already reveal increased infrastructure and use of bicycles in Brazilian cities (IEMA, 2010).

From this lack of information, numerous assumptions are made about the actual and potential bicycle users, but none has a link to reality. As a result, the lack of information limits the identification of opportunities to develop local economy and does not contribute to cyclability improvement in Brazilian cities. In this scenario, one can note the proactive efforts of civil society organizations and academia to produce better quality information to support effective implementation

of cycling-inclusive public policies. A recent example is the national survey on the Brazilian Cyclist Profile and his/her motivations for using the bicycle (TRANSPORTE ATIVO, 2015).

The survey results indicate that cycling has two main motivations: utilitarian and leisure commutes. In the former, the motivation is the completion of an activity (work, education or shopping). In the latter, it is the commuting itself (recreation, sports and/or tourism) that is the motivation. As the relationship between mobility and tourism is very close because it depends on varied commutes to access and move between the various tourist attractions, cycling can be an opportunity for the development of tourist destinations according to the assumptions of sustainability (BRASIL, 2010).

Thus, in this exploratory study, our aim is to analyze the relationship between bicycle, mobility and tourism from the results of the national survey on the Brazilian Cyclist Profile and the experience of the city of Niterói (municipality of the Metropolitan Region of Rio de Janeiro) for bicycle touring development.

Urban And Tourism Mobility

Cities are in a constant process of transformation, which also results from the contribution of mobility to this process, including tourism and modes of transport (ALLIS, 2013). Given this, the relationship between mobility and tourism, despite being intrinsic, needs to be clarified since it is still little understood. Tourism, as a social phenomenon, stimulates the potential and actual commuting movements of its main actors: tourists and visitors (ESCH; BALASSIANO, 2015). On the other hand, urban mobility refers to the condition in which commutes are carried out, of people and goods in the territory (BRASIL, 2012).

Despite the many reasons (social, cultural, economic, environmental) that cause the individual to move in time and space, these movements (daily and/or occasional), regardless their motivations, are made through vehicles (means of transportation), roads and the overall urban infrastructure that make up the mobility system of cities (MACÁRIO, 2011). Therefore, the intrinsic nature of the relationship between mobility and tourism is clearly understood since there is no tourist activity without the generation (production and attraction) of travel flows in the territory.

Therefore, the lack of an integrated strategic planning between the public bodies responsible for urban mobility and tourism in Brazil creates difficulties for calculating the positive and/or negative impacts resulting from tourist activities. According to Lumsdon (2000), this integration is important in the process of sustainable development of tourist destinations. Based on this perspective, Weston et al. (2012) state that, in Europe, the bicycle has been recognized as a potential tool for sustainable tourism - from the segment called cycle tourism. Cycle tourism is an activity that covers long travels using the bicycle as the main means of transportation, staying overnight in different places during the ride; and daily tours using the bicycle and the residence or means of lodging as base, encompassing both visitors and city residents (FAULKES et al., 2007; LAMONT, 2009; ZOVKO, 2013).

In Germany, considered the major cycle tourism destination in Europe, a cycle tourist that takes one day tour spends €16.00 on average - while the average daily expenditure for cycle tourists that stay overnight along the route is €64.00 (CYCLING EMBASSY OF DENMARK, 2012). Despite the lower average daily expenditure, day tours feature a larger volume of trips than overnight tours. As a result, the economic value per year is higher in day tours when compared to that recorded by the cycle tourists that stay overnight (Chart 1).

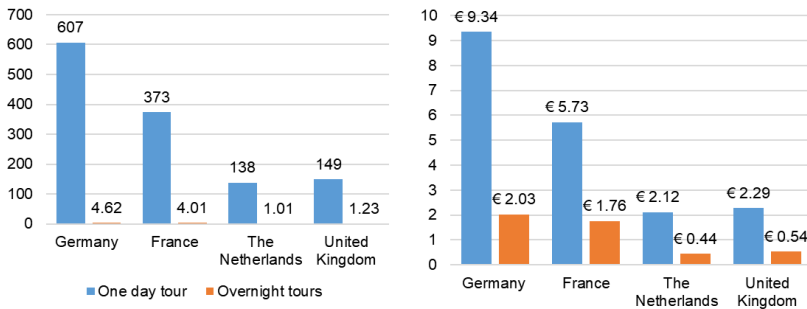


Chart 4.1. Estimated travel and economic value generated per year in European cycle tourism destinations. Source: The authors' own elaboration from Weston et al. (2012).

The highlighted countries, namely Germany, France, the Netherlands and the countries in the United Kingdom, have planning tools oriented by cycling-inclusive public policies that integrate the vision of mobility to the tourism sector (FTMBH, 2002; MEDDE, 2014; SLF, 2009; ZOVKO, 2013). These tools provide guidelines and strategies that will make possible the performance analysis of the cycle tourism segment, infrastructure development and associated services, besides the encouragement in the promotion of tourist itineraries in the destination area at the national, regional and local levels (SALDANHA et al., 2015).

Due to the integrated planning associated with the periodic performance analysis, these countries naturally record more use of the bicycle in utilitarian and leisure commutes. One can take the Netherlands as an example, where the cities with the highest bicycle participation in the modal division range from 35% to 40%, while the smaller ones range from 15% to 20%. Besides, according to Fietsberaad

(2009), the largest users of cycle tourism routes in these aforementioned countries are the residents themselves, and nearly 70% of the regular bicycle users use it for both utilitarian (work, study and shopping) and leisure commutes.

In addition to the economic benefits cited above, bike use provides positive environmental and socio-cultural impacts on tourism activity. Low noise emission, reduced emission of local pollutants and much reduced impacts on land use compared to the effect caused by motorized vehicles, are some classic examples of environmental benefits. As regards socio-cultural benefits, it can be emphasized that owing to its flexibility and speed the bicycle allows greater contact with the attractions during the ride and a greater experience exchange with the local population; the quality of life it provides to the cyclist is also important when wellbeing, health and physical conditioning are taken into account (FMTBH, 2002; NTA, 2007).

In the national scenario there is an undeniable potential for the development of cycle tourism (FRAGA et al., 2015; SALDANHA et al., 2015). Some of the factors that reveal this potential are the very diversity of the Brazilian territory, growth of tourist flows (national and international) and investments in cycling-inclusive public policies by the municipalities. Over the last 10 years, both the Ministry of Cities and the Ministry of Tourism have published documents acknowledging the bicycle's multiple potentials as a tool for sustainable development (BRASIL, 2007; 2010). But, above all, in this scenario, there is a lack of integrated strategies for planning public policies so that bicycle tourist itineraries emerge as an option for encouraging both urban mobility and tourism mobility (BRASIL, 2015b).

Thus, the cycle tourism segment in Brazil will only develop with the production of information and the conduction of periodic surveys that will enable a performance analysis, as it occurs in the international scenario. In this way, it will be possible to assess the needs and

expectations of the current demand and the potential for bike use in tourist itineraries. And, based on this profile, to understand opportunities and challenges for the qualification of cycling mobility for residents and visitors.

Urban development and cycling infrastructure of Niterói

The city of Niterói is one of the municipalities that comprise the Metropolitan Region of Rio de Janeiro (MRRJ). The municipality has a close relationship with the cities of Rio de Janeiro and São Gonçalo, due to geographical proximity, easy access (road and water transportation) and job offerings. As a result, it stands both as a center that generates travels to the capital and as an attractive center for the Eastern Fluminense Region. Its current population is nearly 500,000 inhabitants distributed in an area of 134 km² consisting of 52 districts and five Planning Regions (PRs), namely the Bay Beaches, Northern, Pendotiba, Eastern and Oceanic regions (IBGE, 2010).

The urban development of the city began by the Bay Beaches PR and followed to the Northern PR towards the inner part of the territory setting up the central core of Niterói. It is also in this area that there are the most agglomerated neighborhoods with the largest consolidation of urban infrastructure, supporting urban sprawl towards the Oceanic PR. Throughout this process, problems arose. The most obvious are the lack of infrastructure and services related to urban mobility and the reduction of green areas.

In 2012, Niterói started occupying the fourth position as a municipality that generates more commutes in the MRRJ, surpassing São Gonçalo and presenting the seventh largest growth of the period, after Nova Iguaçu and less important municipalities in *Baixada Fluminense*, the Lowlands of the state. Other relevant data in the

context of the flow of people in the urban environment is modal division, which is the identification of the means of transportation adopted for each commute. The city was one of five municipalities that increased the portion of active transportation (cycling and walking). Besides, Niterói recorded the third highest percentage of motorized individual transport use in 2012, after Maricá and Mesquita (SETRANS, 2012; PREFEITURA DE NITERÓI, 2016).

The economic development of the municipality is based on the service sector, which represents 60% of its gross domestic product (GDP). Tourism is one of its economic vocations. The city has several beaches of renowned beauty and its forest remnants occupy more than 20% of the total area of the municipality. Added to this are the architectural set of buildings, historical monuments and cultural spaces that broaden its tourist potential. Niterói stands out as the third city that receives tourists in the state, after Rio, the capital of the State of Rio de Janeiro, and Búzios. Among its most visited attractions are Icaraí Beach; Caminho Niemeyer (Niemeyer Path); The Museum of Contemporary Art (MAC); the most important set of military forts and fortresses in Brazil; in addition to the largest collection of works by architect Oscar Niemeyer, after Brasília, including the Niemeyer Path (NELTUR; 2016b; MINISTÉRIO DO TURISMO, 2016).

Despite this, the tourism potential of the city is still little explored in the central area. An opportunity to reverse this framework arose with the creation of the Urban Requalification Project aimed to rescue tourism and build leisure areas for the local population and visitors. The whole of these investments will give priority to the revitalization of the Maritime front and the requalification of public spaces with infrastructure implementation, with emphasis on the promotion of bike use.

Currently, Niterói has approximately 30 kilometers of cycling infrastructure (bicycle paths and bicycle lanes) and has a schedule to

duplicate it until the end of 2016. In Figure 4.1, it is possible to observe the layout of the existing bike path network, the location of the tourist attractions and the demographic concentration of the city considering the zoning proposed by the national survey on the Brazilian Cyclist Profile (PREFEITURA DE NITERÓI, 2013; TRANSPORTE ATIVO, 2015).

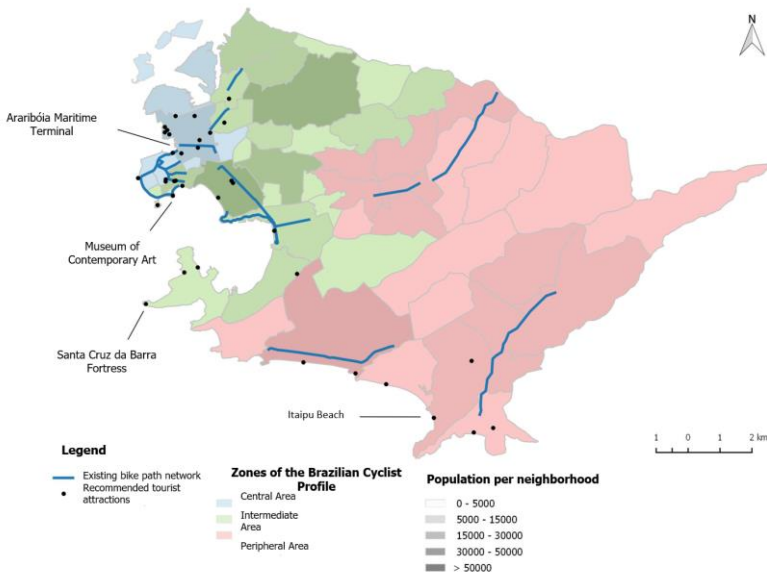


Figure 4.1. Bike path network, demographic concentration by neighborhood and tourist attractions of Niterói. Source: The authors' own elaboration from IBGE (2010); Prefeitura de Niterói (2013); Transporte Ativo (2015); Neltur (2016b).

Therefore, investments for the implementation of a cycling network integrated with the urban mobility system of Niterói can be enhanced by the development of the supply of tourist products that use the bicycle (sun and beach tourism, cultural tourism, adventure tourism, among others), benefiting the local population and city visitors.

Cycling-inclusive policies in the city of Niterói

Following the world scenario in which the debate on sustainability and mobility in large cities revitalized bike use, Niterói included the topic in its political agenda with the first public power initiatives emerging between 2009 and 2012. During this period, the National Tourism Competitiveness Index results were released and Niterói has been included in it since 2010. This index diagnoses the development of tourism in the country. Since then, the city has been among the best non-capital cities, which highlights the importance of Niterói in the debate on urban and tourist mobility since bike use is aligned with the development of sustainable tourism (BRASIL, 2016; EDRA et al., 2015).

Next, there was the elaboration of the Strategic Urban Development Plan of Niterói (2013-2033) and the revision of its Master Plan. Both point to the need for improvement in the conditions of mobility in the city. In this context, the *Programa Niterói de Bicicleta* (PNB) [Niterói Bicycle Program] was created with the aim of stimulating bike use in the city. The program was based on two pillars: (i) cycling infrastructure and (ii) cycling culture and education.

In the first two years, the program promoted the mobilization and meeting of the different actors that influenced the planning and implementation of the actions/projects under the program responsibility, aiming to ensure the incorporation of different population demands related to bicycle mobility (PREFEITURA DE NITERÓI, 2013) – see Figure 4.2.

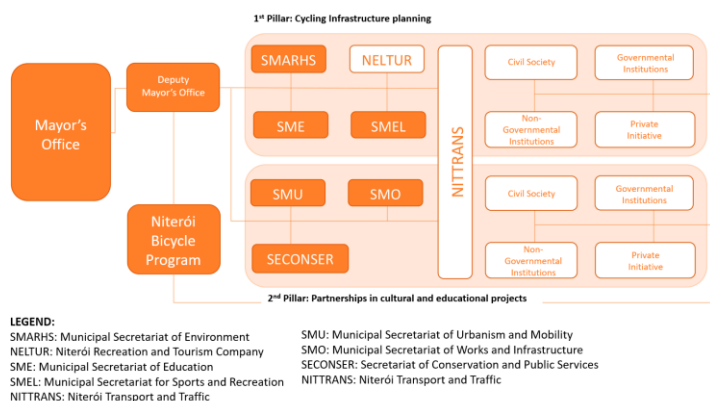


Figure 4.2. Organizational chart on Niterói Bicycle Program (PNB) pillars of action.

Niterói has many ongoing pro-cycling movements that have already shown results, despite being in an early phase. These results have already contributed to call the attention of the population and bring about its interest on the issue, mobilizing partnerships and fostering the creation of an agenda to promote bicycle mobility. In a short time, positive results arising from these initiatives have been obtained, namely quantitative and qualitative data collection on bike use, actions for promoting cycle urban tourism and activities to encourage this means of transportation from its activities in public spaces.

The cyclist profile in the city of Niterói

According to the national survey on the Brazilian Cyclist Profile, bicycle use has two main motivations: utilitarian and leisure commutes. The main destinations reported were work (88%), leisure (76%), shopping (59%) and study (30%). It is interesting to note that of the total number

of respondents who use the bicycle for leisure, only 5% use it exclusively for that purpose.

Analyzing the data for Niterói, we note a greater balance between utilitarian and leisure commutes, and the main destinations were for places of leisure (76%), work (75%) and shopping (70%). These results reinforce the concept of the bicycle as a flexible tool for its users comprising multiple potential uses for the city.

Data on these users were collected according to the methodology and zoning proposed by the national survey on the Brazilian Cyclist Profile. The percentage of respondents in relation to the population (0.015%) was the same adopted for the 10 cities participating in the survey. In relation to zoning, three perimeters were delimited for data collection: central, intermediate and peripheral, respectively. For each of them, three distinct points should be chosen with the following characteristics: lack of cycling infrastructure; with cycling infrastructure; and possibility of intermodality (see Figure 4.2). In Niterói, there were 87 interviewees distributed between the central (30%), intermediate (30%) and peripheral areas (40%).

According to the criteria established for sampling and zoning, it is interesting to analyze whether there is variability in the behavior of bicycle users between these areas so that specific actions might be conducted to favor cyclability. In general, a greater sensitivity can be noticed in data regarding socioeconomic aspects (age, gender, income) associated with the user's degree of experience, his/her physical condition and the goal of his/her commutes. This overall assessment shows the existence of distinct support needs that should guide cycle planning.

From 2009, the city's relationship with bicycle use has gained strength due to the multiplication of pro-bike movements and has successfully implemented an agenda of cycling-inclusive actions. The municipality also has a favorable topography (mostly flat) in much of

its territory. In this way, it would be interesting to identify whether the user's behavior changes according to the central, intermediate, or peripheral areas.

The results of the national survey on the Brazilian Cyclist Profile point out that frequent bicycle use (5 times or more per week) is increasing, with a variation of 60 to 90% between the cities surveyed and that this use is greater among the young population (25-34 years) of the male gender, with income of one to two minimum wages (22-42%). At the same time, the survey reveals that these users have been using the bicycle in their daily commutes for less than five years (42-80%), a fact that can be explained by the recent investments in the implementation of cycling-inclusive policies in Brazil.

As the major consolidation of cycling infrastructure occurred in the central area, it was initially assumed that the highest frequency of use would be in that area, but the result was different. In the central area, data showed that riders use their bikes in a frequency that ranges from 2 to 4 days a week. In the intermediate area, it rises to 5 days a week, and in the peripheral area it reaches the highest rate per week. This is nearly twice as much the rate in the intermediate area and four times as much as in the central area. Perhaps this could be associated with short-distance commutes within these localities, but data once again surprised: all respondents who used the bicycle 7 days a week pedal on average 20 to 30 minutes, possibly commuting between these areas.

The explanation for this can be the centrality and its provision of better accessibility and supply of public transport added to the concentration of shopping locations, services and jobs. Thus, we checked the occurrence of bicycle combination with another mode of transport. In this respect, the area that mostly performs transfers is the central area, with 53% of the interviewed cyclists. Of these, almost two thirds use the ferries and one third use buses. In the intermediate area, 38% responded they carry out a combination with other modes, which

in this area was with ferries. In the peripheral area, half of the respondents claimed to carry out a combination with other modes: 92% with buses, 8% with car and 31% with motorcycle taxi (this mode allows access to irregular settlement communities).

Regarding the period they have been using the bicycle, it was interesting to note that most of respondents in the central area (47%) indicated a period of less than one year. While in the peripheral area 62% have been using it for more than five years. In this case, it can be assumed that the expansion of the cycling-inclusive infrastructure, with greater consolidation in the central area, facilitates the insertion of the less experienced users. Conversely, in the peripheral area there is greater resilience of the experienced users in relation to infrastructure deficiencies.

Despite some variation due to the particularities in the degree of urban development in those three areas, the respondents argued that the main problem in their daily commutes comprised three aspects: lack of infrastructure adequate to bicycle use, lack of respect on the part of motorized drivers and lack of traffic safety.

Although the lack of traffic safety is cited as one of the main problems faced by cyclists, the survey revealed that only 14% of respondents had been involved in a traffic accident in the last three years. But, on the other hand, it is understood that the lack of adequate infrastructure, coupled with the lack of respect on the part of motorized drivers, is directly related to the feeling of lack of traffic safety, especially in the case of the less experienced users.

When comparing Niterói to the other cities surveyed, two aspects are highlighted: the possibility of intermodality, accessible to 41% of cyclists, and the largest female participation (13%) in relation to the total use of the bicycle, which represents twice the national average. In the case of intermodality, this is due to the possibility of integration with the ferries at the link Niterói-Rio de Janeiro without additional

cost. While the national average did not exceed 26%, the figures of Niterói are comparable to those of Brasília, where more than half of cyclists have access to some mode of integration, and the access of passengers with their bicycles to the subway is released throughout the day.

Discussion about Niterói's experiences

Since the beginning of 2016, the city of Niterói has established a partnership with the academia and civil society to boost bicycle use aligned with the existing potential for the development of cycle tourism in the municipality (EDRA et al., 2015; FRAGA et al., 2015). The ongoing actions design a circuit with tourist cycling routes integrated into the urban mobility system of the city to encourage bicycle use by residents and visitors. The goal of the circuit creation, initially, is to produce a diversified tourist supply in the historical-cultural (covering the historical center of the city, museums and architectural works of Oscar Niemeyer) and natural segments (covering the beaches of Guanabara Bay and the *Parque da Cidade* [City Park]).

The proposed tourist cycling routes followed a method of participatory cycle planning called Specific Optimization per Area, adapted to the Brazilian reality and with collection of local data on demand and supply. This method allows a greater level of detail about the users' needs in relation to the provision of infrastructure and associated services in each area and facilitates decision making and investment guidance (HULLEMAN et al., 2010). In addition, it allows the visualization of upcoming actions.

The city of Niterói is divided into five planning regions (Bay Beaches, Northern, Pendotiba, Oceanic and Eastern regions) with 52 districts in which nearly 500,000 inhabitants reside (IBGE, 2010). The national survey on the Brazilian Cyclist Profile, aiming to facilitate the

comparison of the results between the cities, established the division of the territory into three perimeters: central, intermediate and peripheral areas (TRANSPORTE ATIVO, 2015).

The visualization of the existing cycling infrastructure and the tracing of cycling routes makes clear that it is possible to establish a connection between the central, intermediate and peripheral areas, which will reinforce the convergence between urban and tourist mobility in the city of Niterói (Figure 4.3).

With the ongoing project of the tourist cycling routes, it was possible to carry out monthly tours open to the public to test its viability (NELTUR, 2016a). With this, it was possible to draw the attention of locals and visitors to the city's tourist itineraries, as well as provide a more secure and welcoming experience to potential bicycle users in the urban environment. In its first two editions, it was noted that there was a significant increase in the female gender in both editions (43% and 47%, respectively), a fact that contrasts with the results of the counts in one of the main downtown bicycle paths, with an average of 13% (FRANCO, 2016). Taking into account that more than half of all participants were from Niterói, the greatest motivation for participation in both editions was precisely the possibility of cycling through the city in a more tranquil and safe way (most respondents claimed they did not use the bicycle daily). The great demand by the population must be highlighted, as the amount of reservations for the tours close within a few hours, and moreover, the final evaluation has been quite positive.



Figure 4.3. Organizational chart on Niterói Bicycle Program (PNB) pillars of action. Source: The authors' own elaboration from Prefeitura de Niterói (2013); PedalUFF-Tur (2016); Neltur (2016b); Transporte Ativo (2015) database.

Given this, in a future moment Niterói will be able to benefit from its strategical geographical location as it is a gateway for other tourist regions (Figure 4.4) and can become a gateway to cycling tourism in the state of Rio de Janeiro (SALDANHA et al., 2015; SOARES; JUNG, 2010). According to the *Estudo de Competitividade dos Destinos Indutores do Desenvolvimento Turístico Regional do Ministério do Turismo* [Competitiveness Study of Induced Destinations of the Regional Tourist Development of the Ministry of Tourism] (BRASIL, 2008), there are four tourist regions comprising 30 municipalities with potential for tourism development in the State of Rio de Janeiro, namely: the metropolitan region, Costa do Sol, Sierra Verde Imperial

and Costa Verde. Together, the city of Niterói and Rio de Janeiro form the metropolitan tourist region. And, as shown in Figure 4.4, Niterói can be seen as a gateway to the regions of Costa do Sol (Sun Coast) and Serra Verde Imperial (Imperial Green Mountains) for cyclists who wish to make intermunicipal trips, knowing the main destinations of each region. In this way, Niterói can become not only a more receptive city to bicycle use but a development inducer for cycle tourism and a reference for the other bordering municipalities.

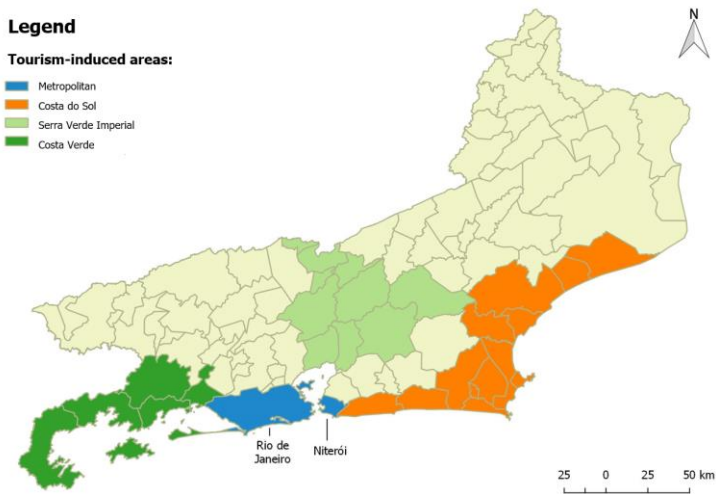


Figure 4.4. Tourism regionalization of the State of Rio de Janeiro. Source: Brasil (2008).

Final Considerations

The objective of this chapter was to analyze the convergence between urban and tourist mobility using the city of Niterói as a case study. This

was possible from the analysis of the national survey on the Brazilian Cyclist Profile and the recent experience of the city with cycle planning and development of tourist cycling routes.

Research on bicycle mobility in Brazil and in the world plays an important role in the current scenario of the development of sustainable public policies and in the requalification of urban spaces. Its main role is to provide quantitative and qualitative evidence that can subsidize public managers in their decision-making process regarding actions and investment strategies in this area.

However, even though pro-bike policies have made progress in the country, we still face difficulties in obtaining data that reveal more than the cycling infrastructure length and the modal division of each city. Hence the importance of innovative initiatives, able to bring together the various segments of society to make possible the realization of surveys such as the national survey on the Brazilian Cyclist Profile. In presenting the motivations and needs of its users, this survey was able to break with old prejudices and assumptions about bicycle use and, consequently, it will encourage social inclusion and the identification of new business opportunities.

The results revealed that bicycle use has two main motivations: utilitarian and leisure commutes. In the former, the aim is to conduct some activity (work, education or shopping). In the latter, the reason is commute itself (recreation, sport and/or tourism). As the relationship between mobility and tourism is interdependent, that is, there is no tourist activity without commuting in the territory, bicycle use is an opportunity for the sustainable development of the urban tourist destinations.

Thus, the importance of the integrated planning of public policies stands out since it is able to add efforts and investments in the structuring of the bike path network and in the diversification of the supply of tourism products that use the bicycle (sun and beach tourism,

cultural tourism, adventure tourism, among others), benefiting both the local population and the city's visitors.

Therefore, it is recommended that the national survey on the Brazilian Cyclist Profile might serve as a model for the development of periodic national surveys. It is also recommended that the periodic national surveys act as an instrument for integrated planning, such as those existing on the international scenario, capable of offering guidelines and strategies that will enable an integrated performance analysis of the cycling-inclusive public policies.

It is worth highlighting how important the economic, environmental and social representativeness of cycle tourism in the world is. Besides, it was also important to recognize the existing potential for the development of this market segment in Brazil, mainly in Niterói, the focus of this case study, due to its favorable topography, strategic geographical position and the tourist potential of the city.

In the last five years, the multiplication of several pro-bike movements in Niterói, even though still in a process of consolidation, have been contributing to the mobilization of partnerships with the academia and civil society, and have also enabled the implementation of an agenda of cycling-inclusive actions. During this short period of time, it was already possible to see the positive effects of these actions. As examples, we can cite: quantitative and qualitative data collection on bicycle use, actions for promotion of urban cycling tourism and activities that encourage bicycle use from its occupations of the public space.

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Chapter 5. Cycling policies, activism and the Porto Alegre cyclist profile

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Introduction

Porto Alegre, capital of the State of Rio Grande do Sul, is part of a group of Brazilian cities in which the question of bicycle use promoted a debate that has been intensified in recent years. This phenomenon is not limited to Brazil and deals with what Luis Vivanco (2013) pointed out as a movement of “reconsideration” of the bicycle.

This “reconsideration” is inserted into a current context of mobility in urban centers with an increasing concentration of people, in which the question of “how to go somewhere” has gained greater relevance (VIVANCO, 2013, pp. 60-61). In Asia, Africa and Latin America, the urbanization process has been more accelerated leading to a population growth that has not been followed by an urban planning and by factors such as the emergence of peripheries and an unplanned motorization process. In addition, there is the context of cities with low population density requiring long-distance commutes. There is also a discouraging ideology that shows bicycle use as not safe, detrimental to traffic, “old” and only focused on leisure (VIVANCO, 2013, p. 63). One can understand that a movement for the diffusion and advocacy of the right to use the bicycle as a means of transportation in Porto Alegre eventually must face these barriers.

Vivanco (2013) considers the bicycle as a tool through which another perception of the city is offered. A perception that is only made possible by the rider in the moment he/she is cycling. As a physical object, a bicycle is only partially apprehended. Its completeness is only achieved when a cyclist uses it (p. 43). It is as Beto Flach, a member of the *Laboratório de Políticas Públicas e Sociais* (LAPPUS) [Public and Social Policy Laboratory], has indicated: it is difficult to speak of a “bicycle user” since the person is the energy that runs it. It is indeed a “a person riding a bicycle”. This is a perspective that brings closer the person who cycles to the person who walks, distancing them from a motorcyclist.

The bicycle can be understood as a kind of “lens” to perceive contemporary dilemmas (VIVANCO, 2013), jointly providing new forms of social organization (OLIVEIRA, 2013). It provides a new perspective of the city, of feeling the city, of being in contact with other people, and the perception of the barriers created by excessive motorization. But as Cadu Carvalho, from *Associação pela Mobilidade Urbana em Bicicleta* (Mobicidade) [Association for Bicycle Urban Mobility], highlighted: the point is not that everyone should ride a bicycle, but the bicycle represents the deep transformations needed to deal with a city whose design has failed.

The way we currently think about the bicycle is completely different from the way people thought about it in other historical times. The first versions of the bicycle, prior to the current model called *safety bicycle*, required the rider to have a great balance, the possibility of accidents (including fatal ones) in streets was huge since they were not suitable for this type of practice at that time. The bicycle was already envisaged as a danger for people moving on foot or on horseback (VIVANCO, 2013, pp. 30-33). In the mid-1890s, in England, it enabled women to achieve more freedom, in a historical time they had to overcome the

existing moral impositions that even questioned the outfits they could wear in public (p. 33). To understand what a bicycle “is” would depend, therefore, on the “when” of the bicycle.

The national survey on the Brazilian Cyclist Profile³¹ in Porto Alegre helps us to address this topic and analyze it from various perspectives. We can start pointing out that, even though the survey targeted several cities and their specifics, the resulting indices were very close. This finding can result from the fact that public policies that consider the bicycle as a means of transportation have basically been set up by the federal government. Therefore, it is worth presenting the historical recovery of public policies, the ways they influenced the creation of the Master Cycle Plan of Porto Alegre and the current situation of its implementation, verifying whether it has actually been carried out.

In addition to data, what is also much pertinent is the presence of civil society entities. The fact that NGOs - both *Transporte Ativo* (TA) which promoted the survey and *Mobicidade* which jointly performed it in Porto Alegre - engaged in data production aiming to identify the demands for bicycle mobility, is much important. In this article, we analyze the relevance of engaged social movements from three perspectives. The first is to fill the gap left by governments, which can be considered a barrier for implementing public policies that focus on mobility.

Another perspective is the process of promoting a “culture” addressed to the need of transforming mobility practices in a scenario in which the conception of a car-centric commute (SOARES, 2013) has reached its level of exhaustion. This process would promote an

³¹ The national survey on the Brazilian Cyclist Profile went to the field in August 2015 and interviewed more than 5000 people who used the bike at least once a week in 10 cities. The research was nationally coordinated by the NGO *Transporte Ativo* in partnership with the *Observatório das Metrópolis* [Observatory of Metropolises] and the Sustainable Mobility Laboratory of the PROURB-UFRJ.

acceptance of bicycle use in everyday life and attract the population to participate in the implementation processes. According to Vivanco, the main distinguishing aspect in the context of urban mobility policies in Amsterdam and Bogota is that in the former social movements were involved and, in the latter, the implementation process was set up by two managements of the municipal governments and had to face obstacles (p. 83).

A third perspective can be understood as one that mediates the previous two: to make the relationship between city, people and bicycles possible. According to Vivanco (2013), this relationship has not been addressed by the vast majority of approaches that focused on the question of bicycle mobility, approaches that concentrated on the field of engineering and planning and roughly follow a “build-that-they-will come” logic (p. 69). Prospects for social inclusion have been developed after activist organizations have recognized and aligned themselves with the demands of other movements (p. 110).

In addition, we can also think about how the many different forms of cycling in Brazilian cities influence the similarities found in the demands pointed out by the survey data. Therefore, it is necessary to mention the existing organizations in Porto Alegre and their role in the promotion of actions and relationship with the government.

The survey data in Porto Alegre serve as an initiative to highlight and document a pertinent demand. The indication of lack of traffic safety as a greater inhibitor to bicycle use as a means of transportation suggests that the daily organization of traffic relations must be reconsidered. It is neither a merely “build-that-they-will-come” situation, as Vivanco pointed out, nor a “will-come-even-without-building” opposite situation that will work. In parallel, data contribute to questioning certain stereotypes, mainly those related to the social class that presents the demand, and to the purposes of bicycle use adopted so far, besides contesting its alleged lack of convenience in the

context of Porto Alegre. The relevance of data production on the topic is linked to the perceived need for dialogue with the public power and provisions for visibility to this question. It must be highlighted that the desired autonomy for moving around in the city does not mean “anonymity”.

This article aims to discuss these issues, providing the readers with a contextualization of the scenario in which the profile revealed by the survey data is inserted. The approaches and references used sought to bring together aspects from the different areas of the authors’ education, comprising Architecture, Anthropology and Law.

Public policies and activism

Public policies are part of a series of government actions that seek to pursue specific objectives and meet the goals of established programs by electing a certain option after having analyzed all the others. This again discloses the main doctrinal aspect of the ruling nature of government action in that its goals are provisions previously defined by the actors of the process. This is, therefore, “government in action” (HOWLETT; RAMESH, 1995, p. 8; SOUZA, 2006, p. 26).

In this sense, it is interesting to analyze the public policy cycle as a consistent process in a series of stages, comprising successive phases that sequentially provide feedback for the formulation of new public policies. Frey (2000) adds that “[...] by dividing the public act into partial phases of the political-administrative process of problem resolution, the ‘policy cycle’ ends up revealing a very interesting heuristic model for the analysis of a public policy life”.

Subirats’ proposal (2012) has been adopted in this analysis, although most of the doctrine identifies that public policy cycle focuses on three consecutive and interdependent phases, namely formulation, implementation and evaluation or control of policy impacts (FREY, 2000, p. 226). The author presents the following phases: i) emergence

and perception of problems; ii) incorporation of the political agenda; iii) policy formulation; iv) implementation; v) evaluation (SUBIRATS, 2012, p. 47). It is a permanent and continuous cycle characterized by ongoing feedbacks.

The public policy cycle is composed of subjects-participants or actors of the most diverse categories, irrespective of type and degree of social participation that form a unifying process of ideas and interests directed to the solution of a demand. In the same sense, Thomas Dye (1995, p. 8) clearly specifies that “*l’attore decisivo del policy making é il governo*” [the decisive actor of policy making is the government]”, because the final decision is strictly based on public administration. Howlett and Ramesh (1995, p. 8) add that “*quando parliamo di politiche pubbliche, parliamo delle azione dei governi*” [when we talk about public policy, we talk about the government’s actions]. In fact, public policies are of exclusive competence of the State entity, even if they have been set up or formulated by other actors. Thus, who defines them is the State for its social legitimacy, permanence and juridical and legal organization that are essential to a lasting production.

However, although decision – of doing or not doing – is a matter of the government entity, it is up to the movements or social actors to promote mobilization, whether by pressure or other action, aiming to establish the agenda setting that will ensure the formulation of the intended public policies.

When applying the theory of the public policy cycle to the specific case of the movement on behalf of the cycling network of Porto Alegre, one realizes that visibility, as an element that guarantees the rights whose agendas have been ignored by the government bodies, was provided by the occurrence of the collective hit-and-run of the *Massa Crítica* [Critical Mass] cyclists in 2011. That is, visibility was provided during the implementation phase of public policy, but movements were already active in the city before that event.

In an interpretation related to this discussion, Lied (2014) identifies the incident of the hit-and-run as an “event-crisis”, one event that promotes visibility and sensitivity on the issue of the right to use the bicycle. This event provided the *Massa Crítica* with a greater space for interlocution and participation in the discussion on the implementation of the *Plano Diretor Cicloviário Integrado* (PDCI) [Integrated Master Cycle Plan] (p. 38) that “had not yet been implemented, even in the *Plano Plurianual* (PPA) [Multi-Annual Plan] of the city [...]” (p. 28). Before the referred event, participants in the *Massa Crítica* had already tried to contact the Municipal Government and *Empresa Pública de Transporte e Circulação* (EPTC) [Public Transportation and Circulation Company] through letters and petitions claiming for a better cycling structure and educational campaigns, but with no success (SILVA, 2011, p. 32).

The tragic incident can then be interpreted as a “window of opportunity”, facilitating the convergence of three aspects which, according to Lied, make up processes that enable the implementation of public policies: recognition of the problem, proposition of alternatives and negotiation processes (LIED, 2014, p. 48).

It is worth saying that the “collective hit” factor strongly resumed the agenda of the cycling network on behalf of the movements and social collectives that used the bicycle as a modal transport, but this was carried out in an invisible way through the streets of the city. It is interesting to note that this negative fact promoted an increase in the cycling movement which started to organize itself, firstly, to demand justice for the hit-and-run driver and to fight against impunity; and secondly, to guide the cycling issues hitherto “forgotten” by the municipal government, as it occurred with the PDCI that had been approved with an estimation of 395 kilometers of cycling network in the city, but remained as a mere document up to that moment, that is,

without any schedule, no implementation dates, and no completion dates.

This fact was so decisive that for some “cycling activists”, the cycle movement of Porto Alegre is divided into two moments: before and after the collective hit-and-run. It is worth remembering that the image of the collective hit-and-run that took place on February 25, 2011 traveled the planet and was released by the most distinguished television channels in the world and was one of the most accessed videos on YouTube in the days following the accident.

It was also from the hit-and-run event that, from *Massa Crítica*, associations were created as legal entities to fight for the cause, aiming to seek specific spaces for interlocution and claim against the Public Power: *Associação dos Ciclistas de Porto Alegre* (ACPA) [Association of Porto Alegre Cyclists], in December 2011; and by *Mobicidade*, in June 2012.

In fact, within the logic of the policy cycle, with the approval of PDCI, the phase of the policy formulation was overcome, and the next phase was the implementation of public policy. It is worth remembering that the sole government body legitimized for its conduction/execution is the municipal body, as the entity holding the organizational capacity, as well as the power to intervene - *strumenti coercitivi* - in the social relations from the moment the implementation of the cycling network starts.

The question of share financing should not also be forgotten since it is the Executive Branch that controls and manages the public budget, an essential element for making real the claims imagined for public policies. This phase is of the exclusive competence of the government entity for the sake of the legitimacy of the implementation of the intended tasks. However, it is worth highlighting that the efficiency and effectiveness of the goals proposed in the formulation phase can be effectively expanded. But this can only take place if the other actors, especially the civil society, play an active role in monitoring the

intervention provisions established in the previous phase. Doing this, the other actors will influence the outcomes expected as a result of the implementation of public policies.

This complex interaction between policy makers (civil society and government) seeks to break with what was termed “State dictatorship”, when most phases are concentrated on the discretionary power of the State in deciding public actions. Therefore, it is the public power that negotiates with the actors involved the right to decide the next actions and plans for the implementation of public policies. This is also the opinion of Hermílio Santos (2005, p. 62) when he argues that “the formulation via policy networks is not based on command and order, but in negotiation and exchange”.

Finally, when the implementation phase is over, the cycle is assumed to have been completed. Nonetheless, even in the “external” route of policy cycle, as it goes beyond the concrete conduction of the process, public policy is evaluated. This phase is considered essential as it is necessary to present the intended results as products on a broader and often unanticipated and undesired context.

When such results or goals are not satisfactory, a shift can occur in the course or in the progress of actions in the policy cycle to correct any planning variances in the formulation and implementation phases. Frey (2000, p. 228) points out that the evaluation phase consists in “checking the impact of deficits and unwanted side effects so that consequences for future actions and programs can be inferred.”

Likewise, Bobbio (2014, p. 13) highlights the importance of the public policies evaluation since it is born of a doubt, which is to determine whether they are producing the effects or results expected initially. Porto Alegre has been facing this problem as the cycling network implemented by the municipal government does not meet the desires and yearnings of the city’s cycling movements, besides being unsatisfactory from a technical perspective.

Municipal cycling public policies of Porto Alegre

The construction of a cycling project for Porto Alegre started in 1981, when the *Secretaria do Planejamento Municipal* (SPM) [Municipal Planning Secretariat] elaborated the *Programa para Implantação de Rede Ciclovitária* [Program for the Implementation of the Cycling Network], a project that was not implemented. At that time, bicycle transport was understood as a complement of urban circulation aiming the integration with other public transport networks.

The basic proposal for the cycling network (Figure 5.1) was determined in view of topographical constraints, availability in the existing road network and a thorough study of the cyclists' desire lines. In total, the network would have an approximate length of 162 km, divided into 3 urban sectors. The northern sector would serve users linked to industrial and stock-storage activities. The sector located along the Arroio Dilúvio intended to meet the students' demand and much of the population drawn by *Parque Marinha do Brasil* [Brazilian Marine Park] through the axes formed by the Ipiranga and Borges de Medeiros avenues. Finally, the sector located to the far south would connect Ipanema, Restinga and Belém Novo, and serve users linked to local activities or to leisure.

Besides the bike path itself, the program thought of creating support sites (with a tire fitter and a pump to calibrate the tires) along the paths, placed in a distance of 2-3 km from each other. At the points in which transfer to the collective transport network would be carried out, the program thought of creating bicycle parking racks to facilitate integration between the modes of transport (PMPA, 2008).

In 1991, the City Council passed two laws: Law n. 6781 establishing the *Sistema Municipal de Estacionamento de Bicicletas* (SMEB) [Municipal Bicycle Parking System] and Law n. 6987 establishing the *Programa Municipal de Ciclovias* (PMC) [Bike Paths Municipal

Program]. In 1997, Law n. 7959 instituted the *Semana da Bicicleta* [Bicycle Week], an annual event that always takes place in the second week of September, when pro-cycling activities are performed that also encourage the construction of bike paths and paracycles. Besides, there are also educational campaigns for cyclists and drivers.

In addition to legislation, there were also more concrete actions. In 1993, a bike path was implemented on the Ipanema waterfront and leisure streets were created. Leisure streets function in collective transport corridors that are closed on Sundays (Érico Veríssimo Avenue, Aureliano de F. Pinto Avenue and the Gasômetro area).

In 1996, the municipal government estimated the costs for the implementation of the main stretches of the 1981 project totaling 24.8 km of bike paths. According to three priorities, firstly were listed 9 km that comprised the stretch from Sertório Avenue to São Pedro Station of the metropolitan train and 8.6 km of the stretch from Usina do Gasômetro to Wenceslau Escobar Avenue. Secondly, 2.8 km of the stretch from Assis Brasil Avenue to Sertório Avenue. And, finally, 4.4 km from the stretch that goes from São Pedro Station to Usina do Gasômetro.

The increase in the number of cyclists, that same year, encouraged the *Secretaria do Meio ambiente* [Environmental Secretariat] to publish and distribute the Cyclist Guide. The manual aimed to combat the fear and misinformation of new cyclists and people who did not use the bicycle for transportation. The publication comprised the location of cycling roads, instructions on how to behave in the streets, take care of the bicycle and on the cyclist's personal safety.

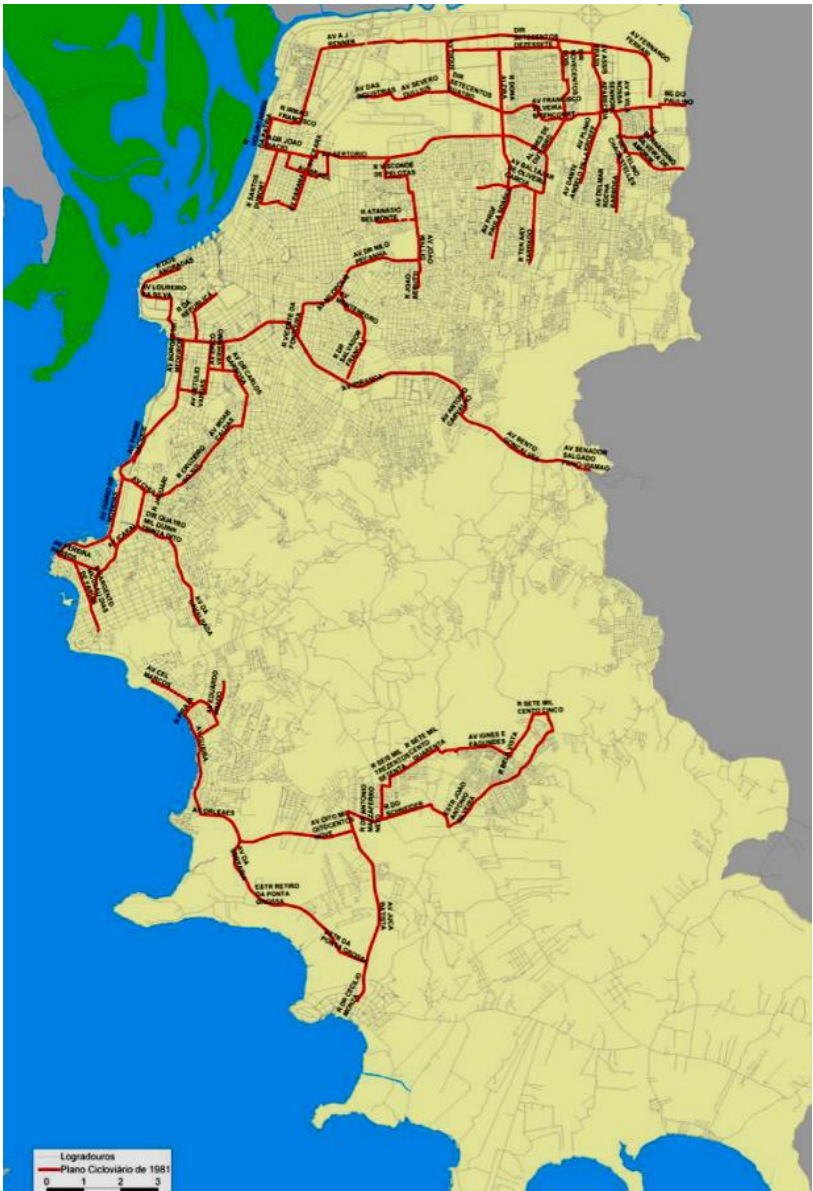


Figure 5.1. Streets layout proposed by the 1981 Plan. Source: PMPA (2008).

Three years later, in 1999, the EPTC started a cycling encouragement project appointing inspectors to perform their work using the bicycle. Bicycle use was adopted by the Military Brigade not only in Porto Alegre, and this practice was extended to the entire state. In that same year, the first *Plano Diretor de Desenvolvimento Urbano e Ambiental* (PDDUA) [Master Plan for Urban and Environmental Development] of the city was promulgated in the city and its bicycle path network was incorporated into the urban transport system (PMPA, 1999).

In 2000, the municipal government launched the Cyclist Guide of Porto Alegre, a map with the most suitable routes for cyclists. In September 2001, the *Caminho dos Parques* was inaugurated, a bicycle lane connecting four parks of the city: *Moinhos de Vento*, *Farroupilha*, *Mauricio Sirotsky Sobrinho* and *Marinha do Brasil*. *Caminho dos Parques* was open only on Sundays, when it was forbidden to use or park the car in the lane. In 2006, the Sunday's bike path was created in the bus corridor of the III Perimetral, an arterial road of the city.

In 2005, the Observatory of the City of Porto Alegre (ObservaPoa) was created aiming to build a broad base of georeferenced information on the municipality of Porto Alegre and, thus, contribute to consolidating the citizen participation in the city management. Among other indicators, the ObservaPOA monitors accidents involving the bicycle, checking each neighborhood and each region of the city, which has been a contribution to cycle planning (Table 5.1).

2000		2010		2015*	
Total city	149	Total city	303	Total city	214
Sarandi	10	Sarandi	30	Sarandi	11
Cristal	6	Restinga	26	Historical Center	10
Belém Novo	5	Rubem Berta	11	Partenon	8
Restinga	5	Cristal	9	Santana	7
São José	4	Belém Novo	9	Restinga	7
Menino Deus	4	Azenha	7	Belém Novo	7
Rubem Berta	4	Ipanema	7	Floresta	6
Santa Tereza	3	Humaitá	6	Menino Deus	6
Vila Jardim	3	Historical Center	6	Ipanema	6
Rio Branco	3	Partenon	6	Rubem Berta	5

Table 5.1. Accident data involving cyclists in the city and 10 neighborhoods with more occurrences in 2000, 2010 and 2015*. Source: Observapoa (2016). *In 2015, a total of 49 accidents did not have their location disclosed (unknown address).

Table 5.1 shows the number of accidents involving cyclists in three different years: 2000, 2010 and 2015. One can note that the numbers of 2010 are higher than those of 2000, because in 2010 the city showed an increase in bicycle use. It is interesting to note the correlation between lack of safety and poverty presented by the neighborhoods of Sarandi, Rubem Berta, Belém Novo, Restinga which are those with the higher rate of accidents and with a low Human Development Index (HDI).

Still in 2005, the *Empresa de Trens Urbanos de Porto Alegre* (TRENSURB) [Urban Trains Company of Porto Alegre], aiming to promote bicycle use among its users, elaborated the Diagnosis on the Bicycle - Train Integration along the 17 stations of Line 1, between

Porto Alegre and São Leopoldo. In this study, it was investigated the Trensurb's users opinion on the implementation of *Trem de Domingo* [Sunday Train], which would assign a wagon, on Sundays, for boarding cyclists and their bicycles. The survey revealed the interest of train users to use the bicycle to commute to the station if there were permanent surveillance (36.58%) and a safe place to store the bicycles (31.71%) (BRASIL, 2007).

In 2008, the Master Cycle Plan of Porto Alegre was delivered. It brought, in addition to guidelines, norms and regulations, two proposals of implementation: the potential network with 395.2 km and the structural network with 124.2 km. The elaboration of the cycling network had as reference the systematization of the data presented in the diagnosis of the PDCI, of the analysis of the PDDUA, the *Plano Diretor Setorial de Transporte Coletivo do Município de Porto Alegre* (PDSTC) [Master Sectoral Plan of Mass Transport of the Municipality of Porto Alegre] and the Program for Implementation of the Cycling Network of the SPM of 1981.

In addition to these sources, for the route's layout were used different points of attraction, namely transport terminals, centralities, job-creating poles, high-density living areas. After analyzing the structural data, technicians ran more than 700 km on a bicycle to identify conflicts and to conduct interviews with cyclists who suggested alternative routes. These new data have made it possible to trace and try new routes which, in certain cases, have been added to the cycling proposal (PMPA, 2008).

The PDCI was consolidated by the Complementary Law n. 626 of July 15, 2009. According to this law, the city routes reurbanized with resources from *Programa de Aceleração do Crescimento da Copa* (PAC Copa) [Growth Acceleration Program and the World Cup], that is, PAC Copa resources, should include bike paths in the project. Thus, the instrument forced the destination of 20% of the resources obtained

through traffic fines for the construction of bike paths (a provision repealed by the City Council in 2014) and established that large enterprises would build, as a counterpart, for every 100 parking spaces, 200m of bike paths. However, in December 2015, seven years after the publication of the PDCI, Porto Alegre had only 35.8 km of bike paths out of 395.2km proposed (O Sul, 2016).

The cyclist profile

The conduction of surveys on the profile and opinion of cyclists in both transport and traffic planning in Brazilian cities is not usual. However, recently, some municipal administrations have carried out specific surveys on bicycle use. Some studies and projects requested by companies and traffic technicians have included data surveys on cyclists' mobility. Research is an important source of auxiliary data for the implementation of cycle planning and the launching of projects. It is also recommended that they should be performed before and after the implementation of projects as a way of monitoring the behavior and satisfaction of the demand (BRASIL, 2007).

The process of choosing a means of transportation is not simple. It will depend on the socioeconomic characteristics of the individual, the reason for the journey, the distance and the means available. The choice for the bicycle, similarly, is subject to variables such as: distance to be travelled; travel time; topography (slopes or elevations of the terrain); climatic conditions; personal characteristics (gender, age, income, schooling), status, image/representation of the cyclist, parking, risks of accidents, public safety, policies focused on bicycle use and accessibility characteristics.

At the same time, there are different types of cyclists: the ones that make the home-work-home itinerary, daily; those who use the bicycle to perform services, sportsmen, seasonal cyclists, those who use it to

commute to school and shopping. Each of them presents a different profile. SENER et al. (2009) classify the factors that may influence the decision for the bicycle as a mode of transport in three categories:

- (1) Individual or household demographic characteristics (age, gender, ethnicity, automobile ownership, and family income);
- (2) Individual attitudes and perceptions (perceptions of safety and security, perceived time and cost, attitudes related to participation in physical activities); and
- (3) neighborhood characteristics (land use, environmental factors, presence and types of bicycle facilities).

After analyzing more than twenty studies, Franco (2012) summarized (Table 5.2) the main characteristics of travels and the users' profile in Brazilian cities:

Characteristics of cyclists	
Gender	Male
Occupation	Employed
Age range	< 40 years
Schooling level	Full High School and Fundamental Education
Income	2-5 Minimum Wages
Travel characteristics	
Reason for travel	Work
Reason for choosing the bicycle	Economy
Frequency	5 times a week
Distance travelled	up to 10 km
Time spent	less than 30 minutes
Difficulties	Lack of adequate infrastructure

Table 5.2. The Brazilian cyclist profile. Source: Franco (2012).

In the process of the PDCI elaboration, a survey on manifest demand was conducted to identify which factors hinder and which

factors encourage bicycle use. Fear of accidents, lack of a safe place to leave the bicycle and fear of robbery were the biggest obstacles to bicycle use, and the existence of bike parking racks and bike paths were the factors that would encourage bicycle use. The survey pointed out that little more than 10% of bicycle trips have extensions less than 1 km, about 50% have extensions less than 2 km, 70% less than 4 km, and 90% less than 7 km. In the analysis of the characteristics of the individuals who use the bicycle to commute to work, it was identified that, for the most part, they are men who dwell in regions with favorable topographic relief, have low income and low level of education. They are people who do not have a car and use the bicycle as an alternative to the collective transport and to walking commutes.

Although some cities carried out survey on cyclists, there was scarce knowledge about bicycle users and the use of bicycles for urban transportation in Brazil. Aiming to change this reality, *Transporte Ativo*, in partnership with *Observatório das Metrópoles* (OM) [Observatory of the Metropolises] and *Laboratório de Mobilidade Sustentável* LABMOB [Sustainable Mobility Laboratory] of the PROURB/UFRJ organized, in 2015, the national survey on the Brazilian Cyclist Profile in ten Brazilian cities to know the urban cyclists profile. The data collected and analyzed in this survey offer subsidies for public managers, urban planners and other actors involved in planning so that they can formulate, with greater precision, public policies and actions to promote cycle transport.

Next, the results obtained for the city of Porto Alegre will be presented. Firstly, data on the cyclist profile are shown in relation to income, schooling, age and other personal characteristics. In a second moment, data on travel characteristics, time of bicycle use and issues will be analyzed.

Porto Alegre's cyclist profile: socio-economic characteristics

One can note in Chart 5.2 that the absolute majority of the surveyed cyclists have low-income: 71.90% of respondents earn up to 3 minimum wages. As for schooling, the survey identified (Chart 5.3) that most respondents, almost 80%, are divided between those who have secondary schooling (High School) (39.3%) or have full Higher Education (39.3%).

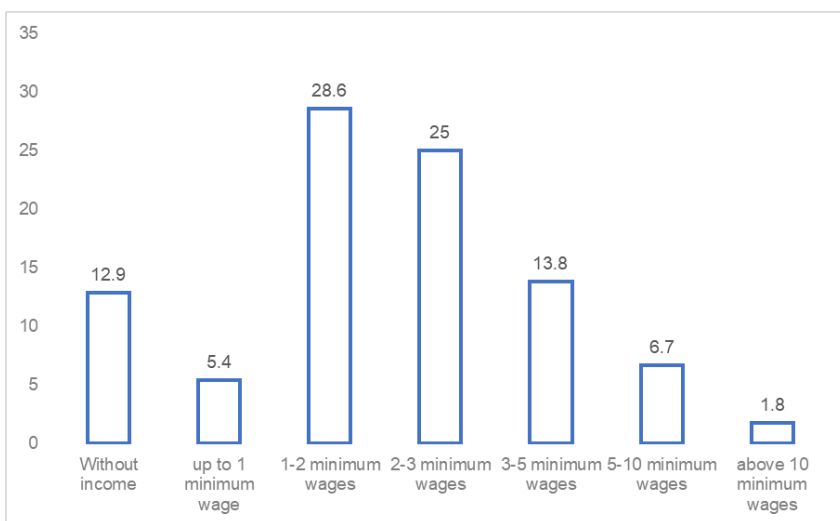


Chart 5.2. Income. A total of 5.8% did not respond. Source: Transporte Ativo (2015).

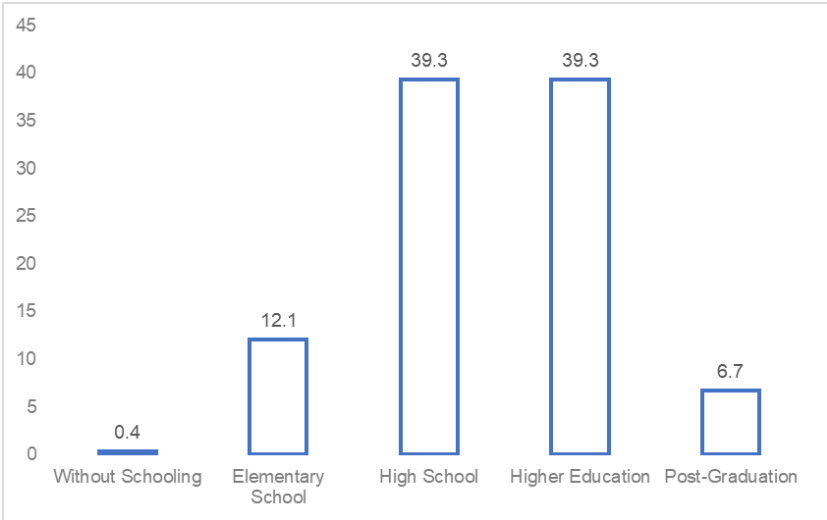


Chart 5.3. Schooling. A total of 2.2% did not respond. Source: Transporte Ativo (2015).

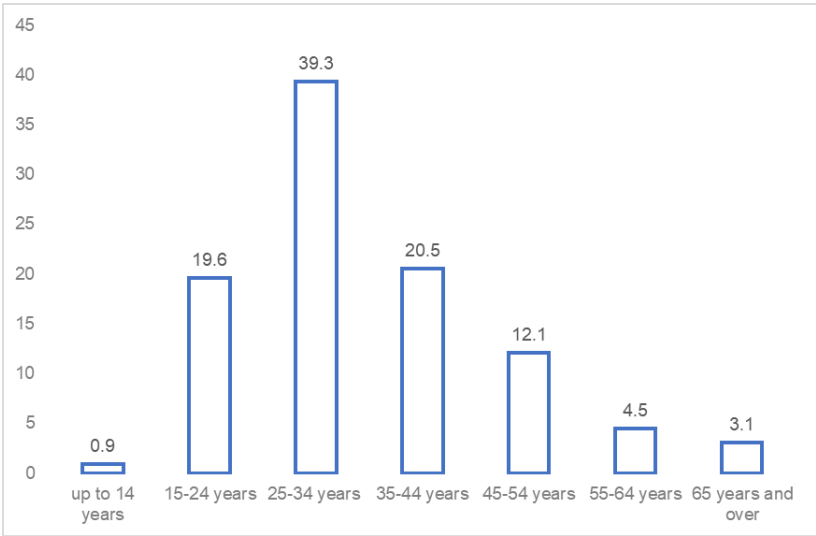


Chart 5.4. Age range. Source: Transporte Ativo (2015).

Chart 5.4 identifies that most cyclists (58.9%) are young people aged 15-34 years. These results are in accordance with the schooling level illustrated in Chart 5.3 (High School and Higher Education). In general, it can be said that the profile of the interviewed cyclists shows that they are low-income young people who have school level adequate to their age range.

Characteristics of Porto Alegre's cyclist trips

Chart 5.5 shows that 25% of respondents use the bicycle 5 times a week, which can indicate that they use it as a means of transportation to the place of work/study. The survey also reveals that 37.9% of the respondents use the bicycle 6-7 days per week indicating that, besides being the means to reach work/study, it is used for leisure. These data show that 62.9% of respondents use the bicycle for the purposes of work/study.

The results shown in Chart 5.6 reveal that most respondents use the bicycle to commute to work (85.5%) rather than to school or college (48.7%). But almost the overall respondents (93.8%) claimed they use the bicycle to go to social activities.

In Chart 5.7, it is observed that most respondents (71.9%) perform fast trips lasting up to 30 minutes, which may mean that they are moving between bordering neighborhoods. A total of 24.1% spend at least twice that time and, therefore, must be riding much longer distances.

Among the motivations shown in Chart 5.8, the one that stands out is that the bicycle is considered a means of transportation that is faster, more convenient and healthier. This is the opinion of 68.8% of cyclists and it is their main motivation for starting using the bicycle. Although most respondents had low income (Chart 5.2), only 20.1% responded that the reason would be economical (cheaper).

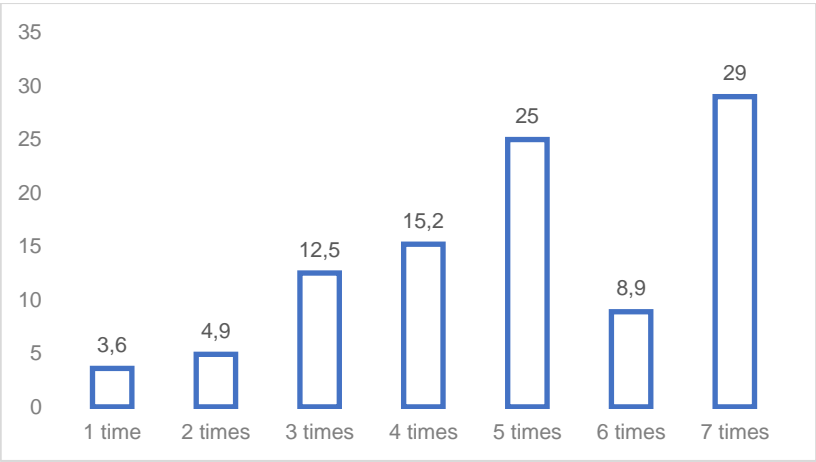


Chart 5.5. How many days a week do you use the bicycle as a means of transportation? A total of 0.9% did not respond. Source: Transporte Ativo (2015).

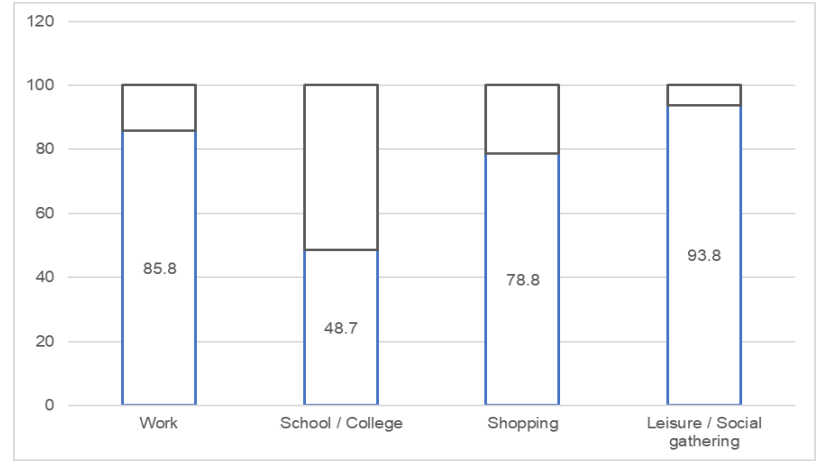


Chart 5.6. To which destinations you use the bicycle as a means of transportation (%). The overall percentage is greater than 100% due to the different trips of the same individual. Source: Transporte Ativo (2015).

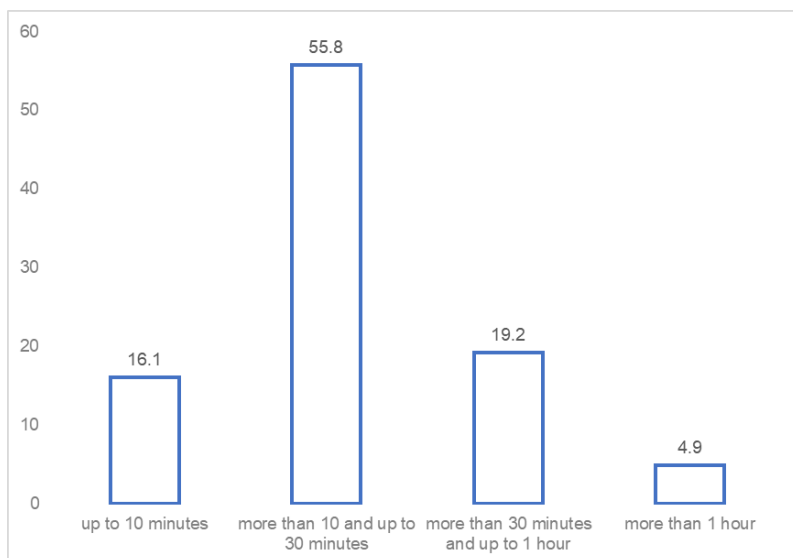


Chart 5.7. Time spent on the most frequent bicycle route (%). A total of 4% did not respond. Source: Transporte Ativo (2015).

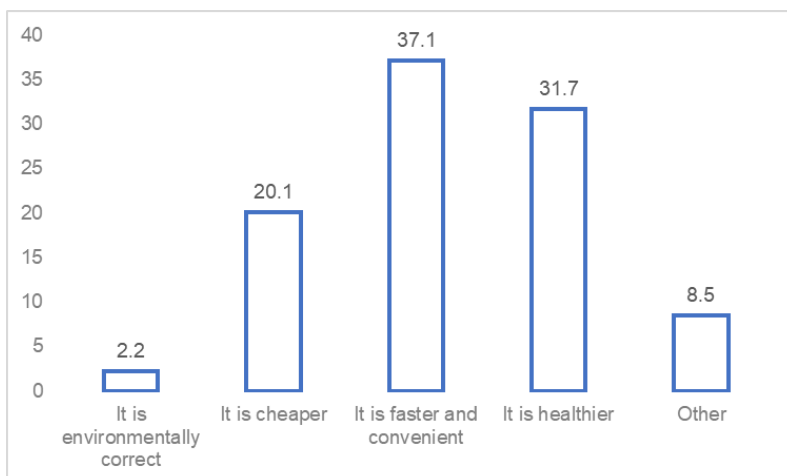


Chart 5.8. Motivation for starting using the bicycle as a means of transportation (%). Source: Transporte Ativo (2015).

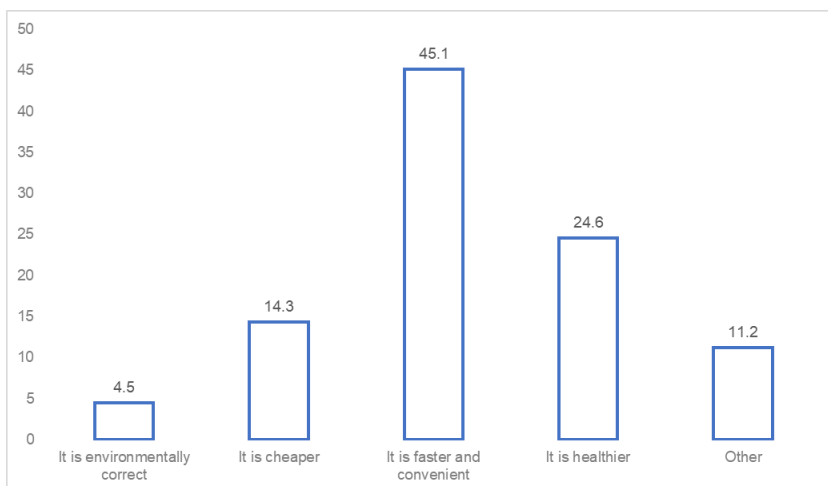


Chart 5.9. The main reason to continue using the bicycle as a means of transportation. Source: Transporte Ativo (2015).

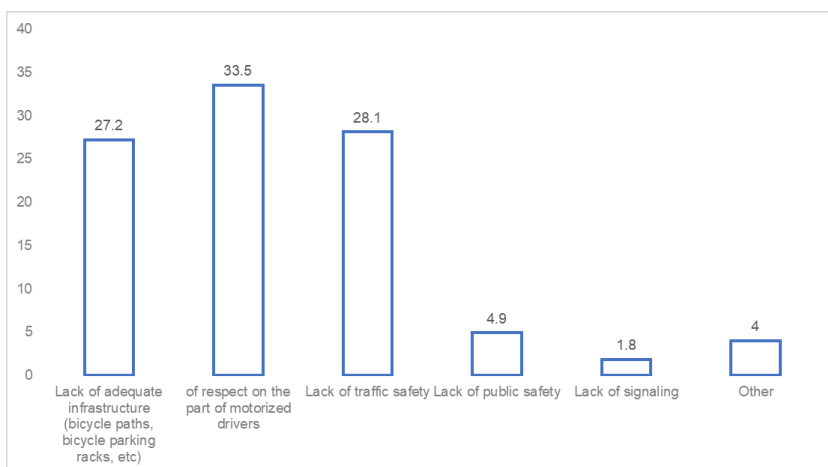


Chart 5.10. The main problem faced when the bicycle is used as a means of transportation (%). A total of 0.5% did not respond. Source: Transporte Ativo (2015).

In the question shown in Chart 5.9 cyclists were asked about the reasons that would lead them to continue using the bicycle as a means of transportation, and they responded they were the same pointed out in the previous question (Chart 5.8): because it is faster, more convenient and healthier (69.7%).

On the other hand, when questioned about the problems faced in bicycle use (Chart 5.10), 33.5% of cyclists responded that it is the lack of respect on the part of motorized drivers, while 27.2% responded that it is the lack of adequate infrastructure such as bicycle paths and bicycle parking racks. A total of 28.1% understand that the main problem is the lack of traffic safety. It is worth pointing out that the lack of traffic safety is closely linked with the lack of infrastructure (bicycle paths) and the lack of respect on the part of motorized drivers in relation to cyclists. When these conditions are added together, lack of safety stands out as the biggest problem from the point of view of 88.8% of cyclists.

When asked about what conditions would increase bicycle use, almost half of the respondents (46.9%) pointed to a broader cycling infrastructure, and 29.5% pointed to an increase in traffic safety. In other words, following the same principle above, the presence of infrastructure is directly related to traffic safety and that is the reason why 76.4% of cyclists indicate the need for infrastructure (or safety) as a factor for cycling more.

The chart shows that 77.7% of cyclists were not involved in accidents as bicycle users in three years prior to the survey. This finding reveals that although their great concern is about safety and safety depends on infrastructure, there seems to be a great awareness on the part of cyclists regarding the procedures they have to follow when they move around in traffic.

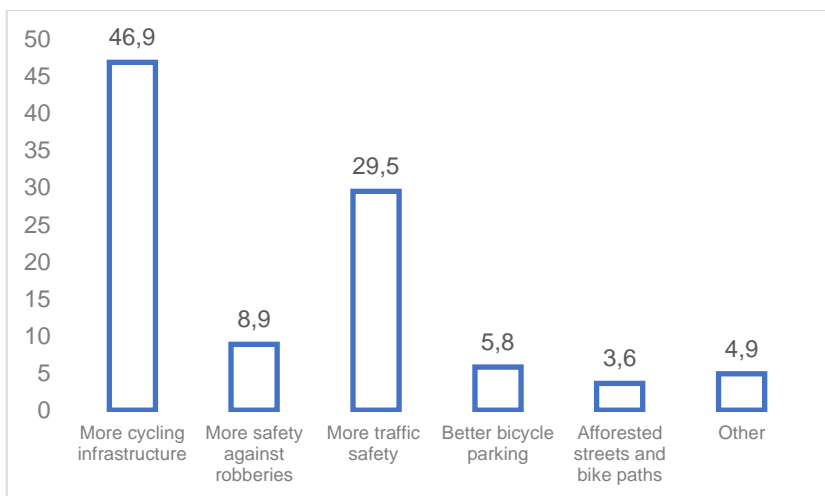


Chart 5.11. What would make you cycle more? (%). Source: Transporte Ativo (2015).

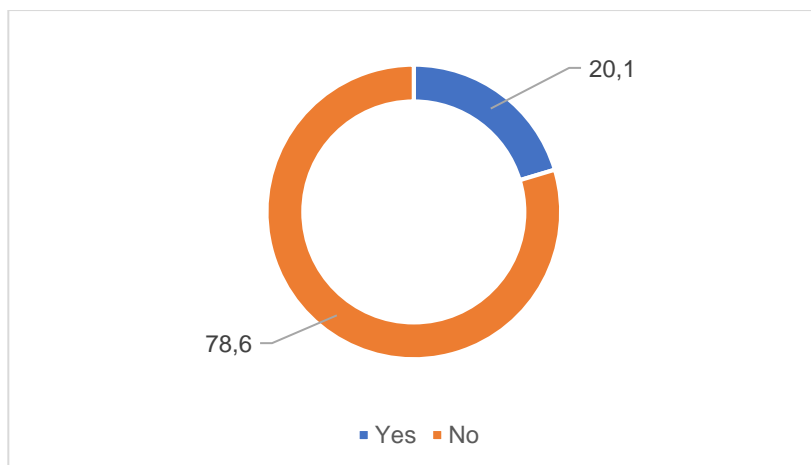


Chart 5.12. Involvement in traffic accidents as a bicycle user for the past three years (%). A total of 2.2% did not respond. Source: Transporte Ativo (2015).

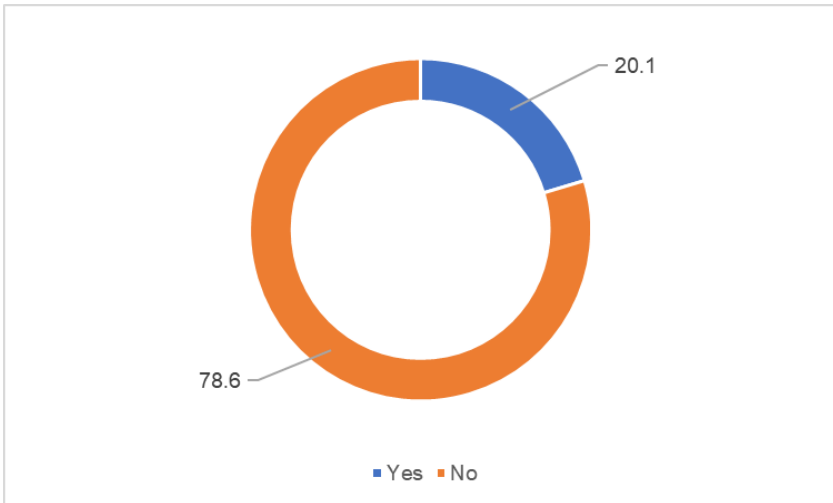


Chart 5.13. Bicycle use combined with another mode of transport on weekly routes (%). A total of 1.3% did not respond. Source: Transporte Ativo (2015).

In Chart 5.13, it is shown that only 20.1% of cyclists combine cycling with other means of transportation. This percentage may result from several possibilities: either travel distances are between neighborhoods and there is no need for modal integration, or there is no possibility of carrying the bicycle in another means of transportation (bus or train), or there are no bicycle parking racks in the stations or terminals.

In a general way, the main point identified from the survey data refers to the correlation between two indices: lack of traffic safety as the main obstacle to cycling and cycling structure as the main provision for encouraging the use of bicycles as a means of transportation. The identification of this “sense of insecurity” and the demand for a specific route to cycle can be discussed from the perspective of cycling structure as a form of social inclusion, allowing more vulnerable people (such as older people) to choose bicycle use as a way to move around the city.

The prospect of inclusion in relation to this topic emerges in the discussion about the different forms of activism for bicycle use. The movement called Vehicular Cycling, which refers to shared pathways - bicycles that share the same lane with motorized vehicles, is criticized by other movements as it is seen as supporting the unaccountability of governments in relation to the provision of infrastructure. According to those movements, cyclists would remain responsible for their safety in their commutes. In addition, Vehicular Cycling would eventually favor a smaller scope of the population, basically male and young (VIVANCO, 2013 p. 107). It is not that the prospect of sharing the same routes of circulation should be discarded (moreover, this prospect also involves the need for measures relating to infrastructure and traffic education), but it only reveals the need to consider other actions.

The idea of the need to broaden cycling structure as a way of promoting bicycle mobility also merges with the possibility of entities, such as *Mobicidade*, arguing that demand comes first, and provision of structure comes next. What is shown by the current scenario is that without cycling structure the potential for expanding bicycle use will reach its limit. In addition, the idea of building an infrastructure prior to demand is precisely an influential factor in the fast motorization process in urban centers.

Data on Porto Alegre also allow a reflection on inclusion and accessibility with a focus on class issue. Contrary to a “common sense” that bicycle use in the city would be characteristic of the more favored layers of the population, if we add the indices on the people interviewed who had no income and income up to a minimum wage, we have 18.3%. In addition, the cycling structure implemented in the municipality concentrates in the central region, and according to the final report that was the basis for the Master Cycle Plan, in 2003 the highest demand for bicycle commuting was precisely identified in macrozones corresponding to the peripheral area (PDCI, 2008, p. 52).

Thus, there is a scenario in which encouragement to bicycle use is given by the convenience attributed to bicycle commuting and difficulties are related to lack of safety. The bicycle as an alternative to the car did not present itself as centrally directed towards an idea of environmental preservation and sustainability. The discussion about bicycle use as a possibility that is autonomous and at no cost for population commutes is much relevant.

Final Considerations

The survey conducted by *Transporte Ativo* shows the importance of activism for establishing foundations for the promotion of public policies focused on bicycle use, as already mentioned in the introduction to this text. Processes of data production on cyclists are part of a scenario addressed to the promotion of visibility of the bicycle issue and of influence on public policy formation. But there are also other factors and events that interfere with the process of public policy formation. According to Silva (2011) and Lied (2014), in the case of Porto Alegre, such forms of activism gained greater projection and space since the occurrence of the hit-and-run of the *Massa Crítica* cyclists in February 2011.

The “when” of the bicycle in Porto Alegre in recent years is something that can be revealed, therefore, by this context of activism engaged in spreading and claiming the right to cycling, despite being already a guaranteed right by law. In the case of Porto Alegre, we see the effort of diverse entities, activists for the cause of bicycle mobility, engaging in processes of claims that also aim to fill the “gaps” left by the government bodies, as in processes of data production and demands for visibility of the cause.

An example of a gap that is being filled by social movements is the survey on the Porto Alegre cyclist profile that revealed that most cyclists are young, low-income with a good school level (High School and full Higher Education) and use the bicycle for transportation practically every day for commuting to work or study. Although most respondents were not involved in accidents with the bicycle, the biggest problems were lack of respect on the part of motorized drivers and lack of adequate infrastructure. The demand for cycling structure is correlated with lack of safety but not with lack of convenience in commuting (and, in this, it radically differs from the demands for the expansion of roads for motor vehicles use). This is a fact that should trigger reflections about a reformulation of traffic organization and of people and their ways of relating to each other in this context.

This demand best suits direct actions, such as that of *Massa Crítica*, drawing attention to the issue. Contrary to what certain “common senses” might suggest, we see that the bicycle is inserted in Porto Alegre (as well as in several other contexts) not merely as an instrument for sport or leisure, not as a “whim” of elite segments, but rather as an autonomy alternative so that people with lower income also guarantee their daily needs for circulation.

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Chapter 6. The potential for frequent bicycle use in the city of Recife

Mariana Oliveira da Silveira
Maria Leonor Alves Maia

Introduction

Buehler et al. (2011) and Pucher, Dill and Handy (2010) in their investigations showed that there are several reasons that encourage bicycle use: it is the mode of transport that causes less noise and pollution, the energy required to ride a bicycle is supplied by the traveler itself, its frequent use brings about the benefits of physical activity, it improves heart health and prevents diabetes, obesity and various other diseases. With cycling, there is a huge potential for promoting public health, particularly in cities that currently have low levels of bicycle use. This potential can be one of the solutions to the physical inactivity of these cities (PUCHER; BUEHLER, 2012).

Pucher and Buehler (2012) point out that cycling has the potential for reducing traffic congestion due to the little space the bicycle occupies in lanes and parking lots. Also, bicycle use is more economical for the traveler and for the public power since the infrastructure for this kind of vehicle requires less investment. The bicycle is one of the most affordable modes for its low cost and is considered an easy-to-include vehicle in any social group. In short, it is difficult to find another means of transportation for short distances that is better than the bicycle so far environmental, economic and social sustainability are concerned.

Despite the advantages in bicycle use, it has been observed, however, that this mode of transport is little used by the population of Brazil. According to data from 2013 of the *Associação Nacional de Transportes Públicos* (ANTP) [National Association of Public Transportation], the bicycle as mode of transport is used in only 3.73% of the total trips performed in the country per year (ANTP, 2015). Given this, the difficulty of determining which variables prevent frequent bicycle use in urban agglomerations will be the main issue addressed by this article.

In the two surveys conducted in the city of Recife, one with cyclists and the other with non-cyclists, it was possible to verify some variables that converge and diverge in these two profiles in what concerns the potential for frequent bicycle use. In view of these two surveys, the aim of this article is to highlight the importance of working with certain variables in programs and/or projects addressed to the frequent bicycle use regarding non-cyclists and cyclists.

Survey conducted with non-cyclists of the city of Recife

In a behavioral research performed in 2014 in the city of Recife comprising 500 non-users and sporadic users of the bicycle (considered non-cyclists) of two institutions: 102 participants were from *Centro de Estudos e Sistemas Avançados do Recife* (CESAR) [Center for Advanced Studies and Systems of Recife], a private company of the technology branch, and 398 from *Universidade Federal de Pernambuco* (UFPE) [Federal University of Pernambuco]; results showed that from 13 variables analyzed five interfered with the positive intention of bicycle use (cycling is good for health, the cost of owning and/or using a bicycle, commuting time by bicycle, cycling infrastructure and volume of motorized traffic) and eight may interfere with the negative intention of bicycle use (lack of traffic safety, lack of public safety, fear of cycling, weather conditions, behavioral relationships in traffic between drivers and cyclists, gender, age range and household income). In this research, addressed to the identification of behavioral intentions of frequent

bicycle use (trips to work and/or school), the Theory of Planned Behavior (TPB) and the statistical technique of logistic regression between two samples (SILVEIRA, 2016) were used in its methodology.

Methodology

According to Moutinho and Roazzi (2010), findings have shown that investigations guided by the Theory of Planned Behavior can collaborate to the definition of public policies and make educational campaigns possible. In addition, they highlight that this theory is particularly useful and crucial in circumstances/projects/programs in which people's behavior needs changes.

According to Ajzen (2006), interventions aiming a change in behavior can be directed to one or more of its determinants: to attitudes, subjective norms or perceived behavioral control. Changes in these factors should cause changes in behavioral intentions and, consequently, should cause changes in behavior. However, the subject who plans the intervention should consider whether there is space for change in the selected construct.

Following Ajzen's suggestions (2006) about selecting the target with more space for modifications in an intervention, in the specific case of the study comprising 500 people from CESAR and UFPE, non-cyclists and potential cyclists were targets of this research because there is no interest in modifying bicycle use behavior among those who have already been using it frequently. In this study, potential cyclists are those who sporadically use the bicycle for leisure and/or sport, and non-cyclists are those who do not use it in any way.

According to Ajzen and Fishbein (1980), in addition to the target, other factors are important in the application of the Theory of Planned Behavior, namely action, context and time elements describing behavioral criterion. Ajzen and Fishbein (1980), Heidemann, Araújo and Veit (2012) highlight that regardless of the researcher being interested in singular actions or behavioral categories, one must clearly

define the elements of the behavior he is interested in, i.e. which action, target, context and time will draw the research attention as it progresses.

For the empirical study in Recife, the four determinant factors for behavioral measures were: target – non-cyclists and potential cyclists; action – frequent bicycle use; context – city of Recife; and time – period in which the field research was performed, that is, the months of October and November of 2014 (SILVEIRA, 2016).

Theory of Planned Behavior

The Theory of Planned Behavior (TPB) consists of a multi-attribute model through which behavioral intention – as close one can get to behavior – is determined by three constructs: (1) **attitudes towards behavior**, (2) **subjective norm** and (3) **perceived behavioral control** (AJZEN, 1985). The importance of these constructs in the prediction of intentions is found in various cases of behaviors and situations. In some cases, they are only attitudes with a relevant impact on intention, in others, attitude and control may be sufficient, and, in other cases, the three determinants are relevant (FLEISCHFRESSER, 2005).

In combination, attitude towards behavior, subjective norm and perception whether behavior can or cannot be controlled lead to the formation of a behavioral intention. Thus, the attitude, subjective norm and perceived behavioral control constructs do not directly determine a behavior but rather an intention to exercise it when the occasion is propitious (see Figure 6.1).

As a general rule, according to Ajzen (2002), the more favorable the attitude, subjective norm and perceived control, the greater the personal intention of performing the behavior. Finally, given a sufficient degree of behavioral control, people tend to enact their intentions when opportunities appear. Therefore, behavioral intention is considered the immediate predecessor of behavior. In the Theory of

Planned Behavior, behavior is the compatibility between intentions and perceived behavioral controls.

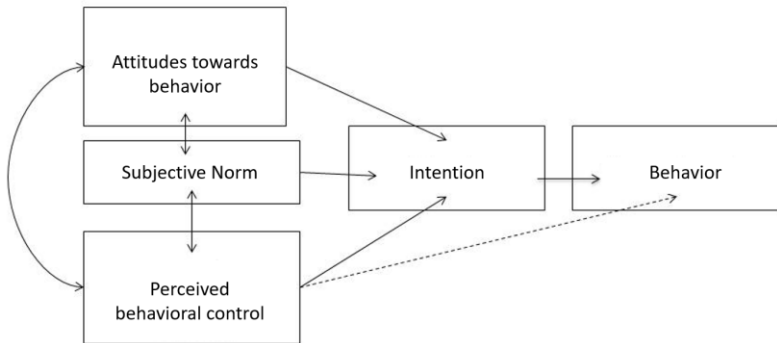


Figure 6.1. Theory of Planned Behavior. Source: Ajzen (1991), adapted by the authors (2016).

Some authors advocate the assumption that behavior should not be measured through only three constructs as it occurs in the Theory of Planned Behavior. The inclusion of other factors can facilitate and determine behavioral intention more accurately. In the literature, Limayen and Hirt (2003) are an example since they propose the inclusion of habit as a reference to past behaviors that result in the repetition of behaviors in the present time.

Next, three TPB constructs are shown: (1) according to Ajzen (1991), **attitude** refers to the degree of personal assessment, which may be favorable or unfavorable in relation to the behavior in question; (2) **subjective norm** refers to the perception of the expectations that individuals or groups have regarding their behaviors (PEIXOTO, 2007); (3) for Ajzen (1991), **perceived control** over behavior is defined as the individual's belief about the degree of ease or difficulty to perform a certain behavior.

Selection of variables for field research

In a survey conducted with a sample comprising 16 national surveys and 34 international surveys from 2000 to 2013 showing the barriers and motivations to bicycle use, 42 variables that can interfere with the intention of frequent bicycle use were identified (SILVEIRA, 2016). Based on the fundamentals of the Theory of Planned Behavior, in a selection of the variables that will be applied in a standard TPB questionnaire only the salient variables should be considered. These variables are the most readily accessible in the memory of people and are the variables that the individual expresses more commonly and in greater intensity. This type of variable, besides being able to be raised by essay questions, may be formed as a result of direct observation, inference process or acceptance of information from other sources such as friends, television, newspapers, books, etc. (AJZEN, 2005), as it occurred in this research.

Of the 42 variables raised, 36 met the characteristics of the three types of the TBP constructs. The other six variables fall into other categories, but they can also be constructs of the TPB since this theory is open to the inclusion of new constructs. This classification of variables regarding the beliefs and constructs of the Theory of Planned Behavior and other constructs was based on the observation and analysis of seven available surveys on the SCOPUS base from 2000 to 2013 that use the TPB to deal with bicycle matters (SILVEIRA, 2016). After analyzing the number of times each variable was cited in the survey conducted in the 16 national and 34 international surveys, of the 42 variables raised, a total of five variables related to the constructs of the Theory of Planned Behavior were the ones most mentioned (at least six times each one) and one variable related to the descriptive norm was also well mentioned (nine times). The other 36 variables less mentioned among the national and international surveys were not considered as salient variables by other surveys in general; however, the low frequency

of citation of these 36 variables does not deprive them of their merit, especially due to the importance attributed to the distinct characteristics of each site surveyed (SILVEIRA, 2016).

The six variables classified as salient beliefs and that can be explored in a TPB standard questionnaire in investigations addressing the identification of the intentions of bicycle use were: (1) 'cycling is good for health'; (2) 'commuting time by bicycle'; (3) 'weather conditions'; (4) 'lack of traffic safety'; (5) 'cycling infrastructure' and (6) 'behavior between drivers and cyclists in traffic'. In addition, the field survey included seven more variables highlighted in a few investigations addressing the question of bicycle use (SILVEIRA, 2010; Aliança Estratégica Holon and Valença & Associados, 2013) and was carried out in Recife. They were: (6) 'the cost of owning and/or using a bicycle', (7) 'motorized traffic volume', (8) 'lack of public safety', (9) 'fear of cycling', (10) 'household income', (11) 'age group' and (12) 'gender'.

Given the selection of 13 variables to be analyzed among the 500 non-cyclists and potential cyclists from CESAR and UFPE, an adapted model of TPB was elaborated with additional constructs to the theory (see Figure 6.2). According to the constructs, the variables were distributed as follows: **attitude variable** – (1) cycling is good for health, (2) lack of traffic safety, (3) lack of public safety, (4) the cost of owning and/or using a bicycle and (5) fear of cycling; **descriptive norm variable** – (1) behavior between drivers and cyclists in traffic; **perceived behavioral control variable** – (1) weather conditions, (2) cycling infrastructure, (3) commuting time by bicycle and (4) volume of motorized traffic; and **sociodemographic variables** – (1) gender, (2) age group and (3) household income. The **descriptive norm variable**, which refers to how others behave in relation to their behavior, and variables of a sociodemographic nature were those that were considered additional constructs (SILVEIRA, 2016).

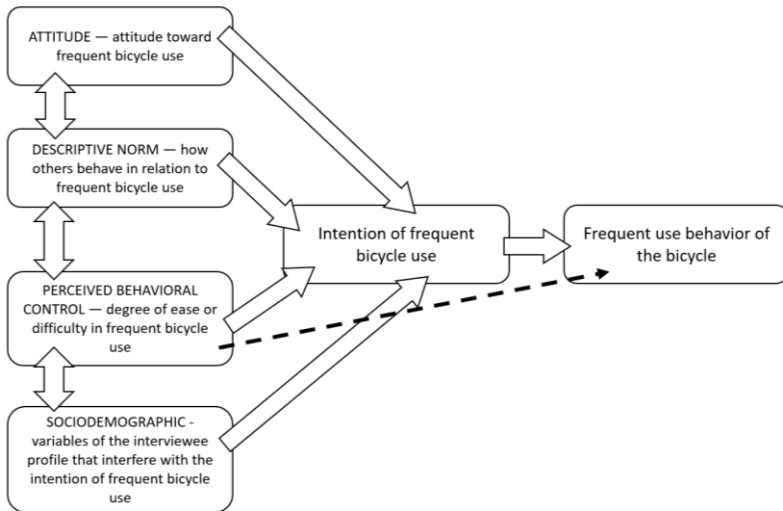


Figure 6.2. Adapted model of the Theory of Planned Behavior used in field research in the city of Recife. Source: Silveira (2016).

In Figure 6.2, the dashed part connecting the **perceived construct control** directly to the behavior of frequent bicycle use shows that individuals are able to predict behavior when feel they have great control over behavior and behavioral intentions.

It is worth pointing out that the original construct of TPB regarding the subjective norm has been disregarded in the model adapted from TPB, because there were no relevant variables in the bibliographic survey that fit this kind of construct. However, that does not compromise the method applied in the survey because, according to the TPB, attitudes can be the predictors of any behavioral intention, or attitudes and control can be sufficient, and, in addition, in other cases, the three determinants would be relevant (those would be attitude, subjective norm and perceived control) (FLEISCHFRESSER, 2005).

After selecting the 13 variables for analysis from the CESAR and UFPE samples, questionnaires were applied. The resulting data were

measured by equations of the Theory of Planned Behavior and by the logistic regression tests generated by the software SPSS version 22.

The measurement of the salient variables, according to the TPB equations, works as follows: the value of the variable importance is multiplied by the value of the intensity of the same variable. These values result from statements designed for the survey questionnaire addressed to the intention of frequent bicycle use regarding each salient variable. In this evaluation, 10 of the 13 salient variables were measured, since those related to the **sociodemographic** construct were excluded because they were only analyzed in the stage of the logistic regression testing. The highest possible value of each variable was 25 (which results from the multiplication of the largest values of the 5-point scale used in the questionnaire – 5x5, indicating that the respondent is totally favorable to that variable) and the smallest possible value was 1 (the respondent is totally against that variable). In this case, mean value (indicating indifference) was 13. With these determined values, it was possible to apply the logistic regression testing.

According to Heidemann, Araújo and Veit (2012), usually in research supported by the TPB, regression testing of the measures is applied in relation to the constructs designed for evaluating behavioral intention. The essence of regression analysis is to predict some kind of result from one or more of the predictor variables. With this, it is possible to infer the influence of the constructs on the behavioral intentions of the respondents. This information is important when designing intervention programs, since its content prevents the program from trying to make changes in constructs that do not have space for changes or that, for some reason, are not determinant of behavioral intentions.

Logistic regression testing

Regression testing can be simple or multiple. The simple type seeks to predict an output variable from a single predictor variable, and the

multiple type seeks to predict a result from several predictor variables. In the research conducted in CESAR and UFPE databases, the output variable or response variable is relative to the 'interest in frequent bicycle use'. Predictor variables would be the variables that interfere with this frequent use such as the salient variables evaluated, characteristics of the respondents' profile (SILVEIRA, 2016).

Logistic regression is nothing more than a multiple regression with a dichotomous categorical output variable and continuous or categorical predictor variables. Stating that a variable is categorical means that it has as possible achievements a quality (or attribute) rather than a measurement (FIELD, 2009). In the case mentioned, the output variable was the 'interest in frequent bicycle use' and the possible answers to this interest in the applied questionnaire were 'yes', 'no' and 'I already use the bicycle'. Those who showed frequency in bicycle use were disregarded in the behavior analysis as they did not meet the inclusive criteria of the audience targeted by the survey (SILVEIRA, 2016).

With logistic regression it is possible to check the probability (P) of the occurrence of the event (Y) 'interest in frequent bicycle use'. The value of this probability in regression ranges from 0 to 1. A value close to 0 means that the occurrence of the event is quite unlikely and a value close to 1 means that the event is likely to happen.

In analyzing the variables that interfere with the occurrence of the event, several tests can be done, and some variables may be evaluated at first and others evaluated in other stages of the test, for example. In surveys that use the TPB, it has been observed that variables of each construct of the theory are evaluated in different stages aiming to verify how each construct interferes with the intention of the evaluated behavior, as it can be seen in the research conducted by Heinen, Maat and Wee (2011) and in the research by Bruijin et al. (2005).

Once the analyses with the logistic regression testing were conducted, the model chosen was the one with values of the predictor

variables showing the closest expected probability (P) value of the occurrence of the 'frequent bicycle use' event.

The most important in the logistic regression analysis is the value of the indicator of change in the probabilities of the occurrence of an event from a change in the values of the analyzed variables, represented by $EXP B$, and the value of the degree of the model adherence to data, represented by R^2 . The R^2 value in logistic regression is determined by the division of the Chi-square of the model by the initial value of the log likelihood (LL), which is a measure that indicates how much unexplained information still remains after adjusting the model (FIELD, 2009).

As regards the value of probability changes ($EXP B$), a value > 1 means that, when the value of the predictor variable increases, the chances of the occurrence of the output variable also increase; a value < 1 means that, when the predictor increases, the chances of the occurrence of the output variable decrease. The output variable must be encoded with 1 (event occurred) and 0 (event did not occur) (FIELD, 2009).

Results

In the CESAR sample

Most people in this sample have an interest in using the bike frequently (62.75%), are adults aged 25-34 years (55.88%) and 35-44 years (23.53%) and have household income greater than 5 minimum wages. CESAR is a bicycle-friendly institution, in which a policy for encouraging this mode of transport has already been implemented through cycling infrastructure in the company itself (SILVEIRA, 2016). The sample logistic regression testing of CESAR showed that attitude variables explain 71.6% of the intention of frequent bicycle use; when added to the variables of perceived behavioral control, the model explains 73.5%; and when the variable 'behavior between drivers and

cyclists in traffic' and the variables 'gender', 'age group' and 'household income' are added, the model explains 78.4% of the intention of frequent bicycle use, which shows the importance of the inclusion of the overall variables in the model. It is important to note that this percentage is related to the interest and non-interest in frequent bicycle use (SILVEIRA, 2016).

Cycling infrastructure together with **cycling is good for health** were the variables that according to the regression testing deserve greater attention, because they interfere with the **positive** intention of frequent bicycle use (have statistical significance of < 0.05 and value of $EXP B > 1$). That is, the fact that cycling is good for health and the issues raised on the quality of cycling infrastructure showed that they are considered important prerequisites that weigh upon the choice of this mode of transport for the cyclists' daily trips (SILVEIRA, 2016).

In addition to the variables analyzed in the survey, other variables that interfere with the intention of frequent bicycle use have been raised in the CESAR sample, and those which stood out were: 'commute distance as barrier to frequent bicycle use' and 'physical activity' as an encouraging aspect (SILVEIRA, 2016).

Given a sample in which 62.75% of people are interested in frequent bicycle use, the interference of the variables in the **non-use** of the bicycle was small. In the third-stage regression, the highest percentage related to lack of interest in bicycle use showed a value of 31.37% of interference. Next, follow some comments about the variables in the non-frequent bicycle use (SILVEIRA, 2016):

- When the **attitude** variables related to 'public safety', 'traffic safety', 'fear', 'cost' and 'health' were inserted into the model in the first stage, the negative influence occurred in 22.54% of the sample;
- When the **control** variables related to 'weather conditions', 'commuting time', 'volume of motorized traffic' and 'cycling infrastructure' were inserted into the model in the second stage, the negative influence occurred in 24.5% of the sample;

- And finally, in the third stage of the model, when the **descriptive norm** variable was inserted for ‘behavior between drivers and cyclists in traffic’ and the **sociodemographic** variables were inserted for household income, gender and age group, the negative influence occurred in 31.37% of the sample.

In short, **cycling infrastructure** and health issues interfere positively in frequent bicycle use among the individuals comprised in the CESAR sample. The following variables were not statistically significant for the occurrence of the bicycle use event: public safety and traffic safety, fear of cycling, commuting time by bicycle, weather conditions in the city of Recife, the cost of owning and/or using a bicycle, volume of motorized traffic, behavior between drivers and cyclists in traffic; and the same occurred with the variables of profile of household income, age group and gender, which may indicate that the overall variables may negatively interfere with this event.

In the UFPE sample

Most people in the UFPE sample (52%) have no interest in frequent bicycle use, which is a cause of concern since resistance to this use is present in younger people (51% are aged 18-24 years) (SILVEIRA, 2016).

The logistic regression testing of the UFPE sample revealed that the attitude variables explain 59.8% of the intention of frequent bicycle use; when they are added to the perceived behavioral control variables, the model explains 63.6%, and when they are added to the ‘behavior between drivers and cyclists in traffic’ variable and the ‘gender’, ‘age group’ and ‘household income’ variables, the model explains 68.3% of the intention of frequent bicycle use, which shows the importance of including the overall variables in the model. It is important to note that this percentage is related to the interest and non-interest in frequent bicycle use (SILVEIRA, 2016).

The cost of owning and/or using a bicycle, **commuting time** by bicycle, cycling infrastructure and volume of motorized traffic were the variables that according to the regression testing deserve greater attention because they interfere with the positive intention of frequent bicycle use (have statistical significance < 0.05 and value of $EXP B > 1$). This result indicates that, at least in the UFPE sample, the measures that focused on these four variables favored the interest in frequent bicycle use (SILVEIRA, 2016).

In addition to the variables analyzed in the survey, other variables that interfere with the intention of frequent bicycle use were raised in the UFPE sample. The variables that stood out were 'commute distance' as a barrier to frequent bicycle use and 'physical exercise', 'environmental issues' and 'convenience of bicycle use' as encouraging aspects, emphasizing the benefits brought by the bicycle in terms of improvement in physical activity, in the environment, in addition to its convenience (SILVEIRA, 2016).

In view of a sample in which 52% of people are not interested in frequent bicycle use, the interference of the variables in the non-use was relevant as it occurred in more than 50% of the sample at all stages of the logistic regression. Here are some comments about the variables in the interference in the frequent non-use of the bicycle (SILVEIRA, 2016):

- When **attitude** variables related to 'health', 'public safety', 'traffic safety', 'fear' and 'cost' were inserted into the model in the first stage, the negative influence occurred in 54.52% of the sample;
- When **control** variables related to 'weather conditions', 'commuting time', 'volume of motorized traffic' and 'cycling infrastructure' were inserted into the model in the second stage, the negative influence occurred in 53.76%. The percentage in this second stage decreased, when compared to the previous stage, because most of the variables inserted (commuting time, volume of motorized traffic and cycling infrastructure) were

significant in the positive intention of frequent bicycle use; however, the number of negatively influenced participants increased from 132 to 138 and the number of positively influenced participants decreased from 85 to 76, which shows that ‘weather conditions’ interferes negatively in the sample;

- Finally, in the third stage of the model, when the **descriptive norm** variable was inserted for ‘behavior between drivers and cyclists in traffic’ and the **sociodemographic** variables were inserted for household income, gender and age group, the negative influence occurred in 54.52% of the sample. The percentage in this stage is the same as in stage 1; however, the number of negatively influenced participants increased from 132 to 149 people and the number of positively influenced decreased from 85 to 68 people, which indicates that among the variables inserted in this stage there is a negative interference in the intention of using the bike.

In short, **cycling infrastructure**, the cost of owning and/or using a bicycle, **commuting time** by bicycle and the volume of motorized traffic interfere positively in the occurrence of frequent bicycle use among individuals comprised in the UFPE sample. The ‘public safety’ and ‘traffic safety’, ‘fear of cycling’, ‘weather conditions’ of the city of Recife, ‘behavior between drivers and cyclists in traffic’ variables and the ‘household income’, ‘age group’ and ‘gender’ profile variables were not statistically significant for the occurrence of bicycle use, which may indicate that these variables may interfere negatively in this event.

Survey conducted among cyclist of the city of Recife

This topic will show a research that is part of the National Survey on the Brazilian Cyclist Profile among 251 cyclists of the city of Recife. Cyclists are considered the ones who already use the bicycle as a mode of daily transport.

Methodology

The National Survey on the Brazilian Cyclist Profile, which is an initiative of *Transporte Ativo* in partnership with several civil society organizations linked to the promotion of bicycle use, approached 5012 cyclists in ten cities of the different Brazilian regions, during the months of July and August in 2015. The organization responsible for the survey on the city of Recife was the *Associação Metropolitana de Ciclistas do Grande Recife* (AMECICLO) [Metropolitan Association of Cyclists of the Great Recife] (TRANSPORTE ATIVO, 2015).

This survey involved more than 100 researchers. The percentage of respondents in relation to the population was the same in all cities. The interviews were done with people who pedaled at least once a week, were also distributed in the urban fabric by the central, intermediate and peripheral areas of the cities and were carried out on weekdays (TRANSPORTE ATIVO, 2015).

Particularly in the city of Recife, the numbers of some counts, conducted by AMECICLO, exceeded 3000 commutes by bicycle (TRANSPORTE ATIVO, 2015), which shows that this mode of transport is highly used even in a city where the public power and/or entrepreneurs have not yet invested in it. It is important to note that the number of respondents in the city of Recife was 251 cyclists.

Results

Among the 251 cyclists interviewed in Recife, the following variables were discussed: (1) how many days of the week the bicycle is used as a mode of transport, (2) how long have you used the bicycle as a mode of transport, (3) integration of the bicycle with other modes of transport, (4) main motivation for using the bicycle as a mode of transport, (5) main reason to continue using the bicycle, (6) main problem faced in bicycle use, (7) what would make a person cycle more, (8) to which

destinations the bicycle is used as a mode of transport, (9) commuting time by bicycle, (10) involvement in traffic accidents in the last three years, (11) age group, (12) schooling, and (13) income. Below is the list of the results obtained in Recife by the National Survey on the Brazilian Cyclist Profile:

- (1) 47.8% of the interviewed cyclists use the bicycle 7 days a week, 15.5% use 6 days per week, 26.3% use 5 days per week, 2.4% use 4 days per week, 4.8% use 3 days per week, 1.6% use 2 days per week and 0.8% use 1 day per week (0.4% did not respond);
- (2) 56.6% of the interviewed cyclists have been using the bicycle as a mode of transport for more than 5 years, 13.9% from 2 to 5 years, 10.4% from 1 to 2 years, 10.8% from 6 months to 1 year, and 6.8% less than 6 months (1.5% did not respond);
- (3) 81.3% of the interviewed cyclists do not integrate bicycle use with other modes of transport and 18.3% integrate (0.4% did not respond);
- (4) 51.4% of the interviewed cyclists claimed that the main reason for daily bike use is the fact that it is faster and more convenient than the other modes, 20.3% claimed that bike use is a healthier option, 16.7% claimed that the bike is cheaper for commutes, 4% claimed that bike use is environmentally correct and 7.2% claimed other reasons (0.4% did not respond);
- (5) 53% of the interviewed cyclists claimed that the main reason to continue using the bike as a mode of transport is because it is faster and convenient, 21.9% because it is healthier, 16.7% because it is cheaper, 2.4% because it is an environmentally friendly option and 5.2% claimed other reasons (0.8% did not respond);
- (6) 52.6% of the interviewed cyclists claimed that the biggest problem faced in bike use was the lack of respect on the part of motorized drivers, 26.3% claimed it was lack of infrastructure cycling, 17.5% claimed it was lack of traffic safety, 2.8% claimed

- it was lack of public safety and 0.4% claimed it was lack of signaling (0.4% did not respond);
- (7) 45% of the interviewed cyclists said that more cycling infrastructure would increase bike use, 31.5% associated the increase in bike use with more traffic safety, 12.7% claimed that it would increase with more afforested streets and bike paths, 8% associated the increase in bike use with more public safety, 1.6% claimed that the main reason would be 'better bicycle parking' and 0.8% claimed other reasons (0.4% did not respond);
 - (8) 95.8% of the interviewed cyclists used the bike to go to work, 73% used the bike for leisure and social gathering, 66.8% used the bike for shopping and 26% used the bike to go to school or college (the general percentage is greater than 100% due to different trips of the same individual);
 - (9) 63.7% of the interviewed cyclists spent from 10 to 30 minutes on their commutes by bike, 18.7% spent up to 10 minutes, 13.5% spent from 30 minutes to 1 hour and 1.6% spent more than 1 hour (2.5% did not respond);
 - (10) 76.9% of the interviewed cyclists were not involved in traffic accidents while cycling in the last three years and 22.3% were involved (0.8% did not respond);
 - (11) 32.7% of the interviewed cyclists were aged 25-34 years, 23.1% were 35-44, 19.5% were 15-24, 13.9% were 45-54, 7.2% were 55-64, 2.8% were 65 years or more, and 0.8% were up to 14 years;
 - (12) 41.4% of the interviewed cyclists had full elementary education, 38.2% had full high school, 13.5% had full higher education, 2.8% had post-graduation education and 2.8% had no education (1.3% did not respond);
 - (13) 39% of the interviewed cyclists earned up to 1 minimum wage, 33.1% earned 1-2 minimum wages, 10% earned 2-3 minimum wages, 7.6% earned 3-5 minimum wages,

1.6% earned 5-10 minimum wages and 4.8% had no income (3.9% did not respond).

Observing the results above and relating some points to the results of the survey that used the Theory of Planned Behavior to identify variables that interfere with the frequent bicycle use among the non-cyclists of Recife (SILVEIRA, 2016), one realizes that variables such as health, cycling infrastructure and behavioral relationship between drivers and cyclists are important factors that appear as salient variables. They also appear in the survey among cyclists as variables that interfere with bike use, which highlights the importance of some TPB constructs in both surveys.

Variables influencing bicycle use among cyclists and non-cyclists of the city of Recife

When the two surveys are analyzed, the variables characterized as barriers to bicycle use are those that stand out, regardless the respondent being a frequent bike user or not. Among the non-cyclists of CESAR and UFPE and cyclists approached by Ameciclo, the variable related to **cycling infrastructure** is very relevant. It was statistically significant among non-cyclists regarding the intention of frequent bike use and it was much cited among cyclists as one of the biggest issues related to bike use in the city of Recife since the city has no cycling infrastructure. In addition, 45% of the interviewed cyclists stated that if there were a good cycling infrastructure in the city, bike use could be increased.

The variable related to the **behavior of motorized drivers** regarding the cyclists was also approached in the two surveys. In the survey applied at CESAR and UFPE, this variable was relevant to the non-frequent use of the bicycle; and in the survey among cyclists this variable was the most cited (52.6%) as the biggest issue to frequent bike use and was considered a barrier to it.

The possibility of the shorter **commuting time** when the bicycle is used as a mode of transport was the biggest reason why cyclists choose this mode in their daily trips. This variable was also important in the non-cyclists of the UFPE sample, where it showed a statistical significance regarding the intention of using the bike often.

The second main reason to use the bike among the cyclists approached by Ameciclo was the healthy nature of this mode. This variable was also relevant among the non-cyclists of the CESAR sample, who claimed that because **bike use is good for health** its importance impacts on the intention of using it frequently.

The question of **traffic safety** and **public safety** was claimed among non-cyclists as a barrier to frequent bike use. Among cyclists, traffic safety was cited as an issue faced in bike use in 17.5% of the sample and public safety was cited in 2.8%, showing that among those who already use the bike these safety variables do not seem to interfere so much with bicycle use. However, when the cyclists were asked about the variables that would increase bicycle use, 31.5% claimed it would be more traffic safety, while only 8% claimed it would be more public safety.

Another variable approached in the two surveys was the one regarding **bike cost**. Among those who already used this mode, a total of 16.7% of the sample claimed that it was the main reason to use the bicycle and to continue using it. Among non-cyclists, this variable was significant regarding the intention of using the bike only in the UFPE sample, possibly because it is a sample with a predominance of undergraduate students who usually have less income or have no income, a fact that encourages bike use since it is a more affordable mode of transport financially. It is noteworthy that in the CESAR sample this variable was not relevant possibly because it is a sample in which more than 80% of people have household income over five minimum wages.

It is worth noting that the variable related to the **volume of motorized traffic** was significant on the intention of using the bicycle often among the non-cyclists of the UFPE sample, but it was not

significant among the non-cyclists of CESAR or among the cyclists approached by Ameciclo, who did not even mention this variable among those interfering with bike use. This fact is curious in front of a city where traffic congestion is relevant and can directly interfere with the positive intention of using the bike and on the already daily bike use, because with this mode there is normally a decrease in commuting time and there is still the possibility of making alternative routes. However, in high mileage commutes, it is recommended that they use bike-transit integration, integrating the bicycle as mode of transport with other modes, which unfortunately is still precarious in the city of Recife.

Finally, by coupling the results of the two surveys with the concepts of the Theory of Planned Behavior, it is understood that the **perceived behavioral control** variables related to cycling infrastructure and commuting time, the **descriptive norm** variable related to the behavior between drivers and cyclists in traffic and the **attitude** variables related to bike cost, health and public safety and traffic safety interfere with the behavior in bicycle use both in cyclists and non-cyclists. Below, in Figure 6.3, follows a summary of the main variables that interfere with bicycle use in the two profiles analyzed in the two surveys.

Main variables that interfere with bicycle use	CESAR's Non-cyclists (SILVEIRA 2016)	UFPE's Non-cyclists (SILVEIRA, 2016)	Cyclists (TRANSPORTE ATIVO, 2015)
	Cycling infrastructure Behavior between drivers and cyclists in traffic Comportamento no trânsito entre motoristas e ciclistas Health Traffic safety Public safety	Cycling infrastructure Behavior between drivers and cyclists in traffic Commuting time by bicycle Traffic safety Public safety Cost of bicycle use and/or bicycle ownership Volume of motorized traffic	Cycling infrastructure Behavior between drivers and cyclists in traffic convenience Commuting time by bicycle Health Traffic safety Cost of bicycle use and/or bicycle ownership Bicycle

Figure 6.3. Main variables that interfere with bicycle use in cyclists and non-cyclists of the city of Recife.

Final Considerations

Analyzing the two surveys, one that involved non-cyclists of two institutions of the city of Recife (CESAR and UFPE) and another that involved cyclists of the city of Recife, it was possible to identify some variables that interfere with frequent bicycle use. As a result, they have provided data that should be used in future programs and/or projects aimed to encourage this use.

Cycling infrastructure was the most prominent variable, considered by non-cyclists and cyclists a barrier to frequent bicycle use. The variables related to traffic safety and public safety were also cited as barriers to bicycle use in the two profiles of respondents; however, it was more relevant among those who do not use the bicycle often yet. Commuting time by bicycle was relevant in the intention of using the bicycle among the non-cyclists of the UFPE sample and it was the most cited variable among the cyclists as the one that encourages bicycle use. These main results of variables that interfere with frequent bike use in the city of Recife are similar to the results of the National Survey on the Brazilian Cyclist Profile. When the overall result is observed among the 10 cities in different regions of Brazil (Aracajú, Belo Horizonte, Brasília, Manaus, Niterói, Porto Alegre, Recife, Rio de Janeiro, Salvador, and São Paulo), it is seen that the faster commuting time when the bicycle is used as mode of transport is cited as the main reason to continue using this mode among 44.6% of the 5012 interviewed cyclists (TRANSPORTE ATIVO, 2015).

Nationally, it was seen that cycling infrastructure accounts for 50% of the opinions among the 5012 interviewed cyclists as being a variable that interferes with the possibility of cycling more, a result that highlights the importance of this variable in the intention of using the

bicycle and in the frequent use of this mode (TRANSPORTE ATIVO, 2015).

With regard to the problems faced among those who have already been using the bicycle nationally, it was seen that the result between the variables was well balanced, in which education in transit that is related to the behavior between drivers and cyclists was cited in 34.6% of the sample, lack of cycling infrastructure was cited in 26.6% of the sample, traffic safety was cited in 22.7% of the sample and public safety was cited in 7.4% of the sample (TRANSPORTE ATIVO, 2015). The results reveal that the problems faced nationally are the same faced in the city of Recife, which shows that the lack of public policies and other initiatives to consolidate the bicycle mode as a daily mode of transport is usual in the overall cities analyzed in Brazil.

Finally, in order to increase the number of cyclists in the city of Recife, it is necessary to help creating public policies that will encourage bicycle use through the expansion and improvement of the little existing cycling infrastructure in the city; through investments in public safety, so that there will be no fear of possible robberies when riding a bicycle; through campaigns to encourage respect toward the cyclist to increase traffic safety; and, it is necessary to invest in campaigns that show the facilities in bike use regarding the time spent in commuting, its convenience and its cost. With regard to traffic safety and public safety, both can be improved in view of the increased number of cyclists in the streets, as reported in the research conducted by Gehl (2013) that drew the conclusion that the volume of bicycle traffic is one of the most significant safety factors for the cycling system. The more bikes circulating in the streets, the more attention the driver should have and less chance of robberies there will be.

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Chapter 7. Bicycle mobility in Rio de Janeiro: who the cyclists are, why and how they cycle

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Introduction

Bicycle use has gained more and more visibility in Brazil, increasing the public debate on its viability as a means of transportation in large cities. To a good extent, the discussion on the bicycle has started to incorporate its recognized positive properties, especially those linked to sustainability and health, in addition to the effectively practical gains in terms of cost and time spent in short and medium distances. Moreover, the bicycle, with its overall benefits for the environment and for individual well-being, has also been appropriated by the advertising narrative and political speeches, always aiming to link characters or institutions to notoriously positive perceptions of urban life. On another front, no less important, the discussion revolves around the public policies addressed to bicycle use as a means of transportation in urban areas.

In Rio de Janeiro, the spread of the idea that the bicycle is an effective means of transportation and is consistent with the city geomorphological conditions is part of the Carioca urban imaginary. Institutional videos prepared by the Brazilian Olympic Committee when Rio was competing to host the 2016 Olympic Games corroborate

this idea. In these videos, the bicycle stars several scenes in varied landscapes of the city thus suggesting that the bicycle is an important part of urban mobility of this metropolis.

Nowadays, according to data from the municipal government, the city has the largest cycling network in Latin America, with 432.5 kilometers of bike paths³². These data, together with a historical struggle for expanding the cycling supply since the 90s, allowed the municipal government to call the city the “Urban Capital of Bicycle Mobility”³³. In recent years, as a strategy to mitigate the chaos of the transport system in the city, the action of the public power has addressed infrastructure construction and large transport projects that sought to reorganize the intraurban mobility system with alternatives such as: BRT (Bus Rapid Transit), LRV (light rail vehicle), subway expansion and BRS (Bus Rapid Service). This type of intervention – whose main motto was the preparation for the 2016 Olympic Games – has given the tone to urban transport policies in Rio de Janeiro.

We must recognize, at the same time, that the opportunity of hosting major international events led the capital of the State of Rio de Janeiro to create provisions for more urban infrastructure. In the case of bike paths, it was not different. It was during the preparation for the United Nations Conference, headquartered in Rio de Janeiro in 1992 (Eco-92) that the city received its first 27 kilometers of bike paths on the waterfront (BINATTI, 2016). Despite the criticism on the part of society and the media, cycling infrastructure was quickly incorporated into the city’s landscape.

³² Data obtained in *Gerência de Programa Ciclovário* (GPC) [Management Cycle Program] of the *Secretaria Municipal do Meio Ambiente* [Municipal Secretariat of the Environment] of the Municipal Government of Rio de Janeiro, in Aug. 31, 2016.

³³ Available at the site of the Municipal Secretariat of the Environment of Rio de Janeiro: <http://www.rio.rj.gov.br/web/smac/rio-capital-da-bicileta>. Accessed Oct. 01, 2016.

A survey conducted at that same year highlighted that 85% of residents supported the bike path after its inauguration, leaving in the past the disturbance caused by its implementation. An analogous fact occurred recently in São Paulo. The largest Brazilian city faced a similar reaction of the public opinion and the media when the municipal government put into practice a plan to implement approximately 400 kilometers of bike paths. But in 2014, the *Instituto Datafolha* [Datafolha Institute] found that 80% of the population approved the bike paths already built, and approximately 60% of the population saw the bicycle as a viable means of transportation for their daily commutes³⁴.

In this context, if on the one hand the controversy surrounding bicycle use in the city is quite manifest and recurrent, on the other, the debate on what makes it a viable means of transportation in large cities is lacking depth and encouragement. The absence of knowledge about the cycling population, especially about its demographic profile, motivations and strategies created to overcome the barriers and urban limits for the use of the bike as a mode of transport, impacts on urban transportation policies.

To a certain extent, the data provided by the survey entitled *Perfil do Ciclista Brasileiro* [Brazilian Cyclist Profile] (TRANSPORTE ATIVO, 2015) filled some of these gaps and contributed to the qualification and clarification of the debate about the use of the bicycle as a means of transportation. Thus, based on its results, in this article we seek to analyze the profile, the commute characteristics and the bicycle user motivations in the context of urban conditions that shape the possibilities and limits of his/her circulation in Rio de Janeiro. We aim, with this analysis, to contribute to the reflection on the cyclist place and

³⁴Available at: <<http://datafolha.folha.uol.com.br/opiniaopublica/2014/09/1520360-80-aprovam-ciclovias-em-sao-paulo-sobe-aprovacao-a-haddad.shtml>>. Accessed Oct. 1, 2016.

role in the city and in what way his/her desires can inspire the creation of public policies that will address active transportation.

Bicycle use as object of study

Changing locomotion habits through a shift from the motorized modal to the non-motorized modal, that is, the bicycle, is seen as a possible and necessary path for building a more democratic city with social, environmental and economic gains – more substantial gains in relation to public health, reduction of greenhouse gas emissions and decrease in transportation costs (ANDRADE et al., 2011).

There are several surveys conducted in other countries that focused on locomotion habits. Two main issues emerge when bike mobility is discussed: (i) does the construction of cycling infrastructure promote increase in the frequency of bicycle use? and (ii) does the construction of cycling infrastructure promotes a modal shift? (ANDRADE et al., 2011).

The results indicate that the implementation of a cycling infrastructure structured in a network integrated into the urban fabric with a sensitive road safety design significantly promotes the increase of frequent bicycle use and the shift to cycling modal.

Two studies in this area are pointed out as references – Bikeability and ‘The Dutch Reference Study’ of the Union of Dutch Cyclists (ANDRADE et al., 2011). These two studies indicate eight relevant points that should be taken into account in the development of policies addressed to bicycle use:

- (1) the high correlation between quality of cycling infrastructure and bicycle use;

- (2) interrelationship between cycling culture and mobility policies. Policies are of major importance to promote bicycle use and can be effective at increasing this mode of transport;
- (3) investments in cycling infrastructure have a qualitative impact – perception of increased users and traffic safety – and quantitative – real increased users;
- (4) citizen involvement in the development of policies and projects is crucial to the success of the infrastructure role in promoting the bicycle;
- (5) travel time and convenience are probably the most important explanations for route choice;
- (6) a cycling infrastructure with clear legibility and connected to the rest of the transport network is essential for the promotion of bicycle use and the daily use of this mode of transport;
- (7) cyclists prefer safe routes with little interference from other modes;
- (8) bike paths with only one direction and following the same direction of the motorized mode of transport are generally recognized as safer.

Despite the advances in cycling infrastructure in Brazilian cities in the last two decades, most urban planning focuses on motorized modes of transport. In Rio de Janeiro, the panorama is similar to the panorama present in the whole country. A good sample can be found in recent investments made for the 2014 World Cup and the 2016 Olympic Games. Rodrigues (2015) noted, for example, that most projects involving the implementation of collective transport services are of the BRT type and, in all those services implemented, projects included road infrastructure, with the construction and enlargement of pathways along the BRT bed and the construction of viaducts and ditches that

aimed to essentially enhance traffic capacity or give greater fluidity to private vehicle traffic.

Differently, Danish and Dutch cities had a paradigm shift in the 1970s when the promotion of bicycle transport became a central theme in urban mobility policies. This shift was directly linked to the number of road traffic victims. From the 1980s, in Denmark and the Netherlands, cycling networks with infrastructure were built with a high-quality standard. This transformation of the urban landscape was an inflection in modal distribution and increased the number of cyclists in urban centres.

In the 1990s, there was a concern to promote the bicycle among motorized transport users and to develop new strategies to encourage the shift from the motorized mode to the non-motorized mode, the bicycle. New actions were implemented and addressed to traffic humanization – especially in speed reduction (BLUE, 2015) – and to the construction of an infrastructure that encouraged bicycle use (among them we can cite shared spaces and “bike highways”).

In Brazil, in recent years, there has been a growth in the number of traffic accidents, including those with fatal casualties. What is worse, national tendencies, according to the 2013 Violence Map (WAISELFISZ, 2013), are not marked solely by the maintenance of car occupancy rates, but also by a slight increase in cyclists’ deaths and, mainly, a violent increase in the lethality of motorcyclists.

On the other hand, in addition to the urban mobility policies focusing on cars and motorcycles circulation, the attempts to reduce accidents – as it occurred with the decrease in road speed – suffered with opposing campaigns and actions despite the positive results, as in the case of São Paulo where, after the reduction of the limit speed in

Marginal Tietê and Marginal Pinheiros, the number of accidents decreased by 36%³⁵.

The bicycle as a means of transportation in the city of Rio de Janeiro

In recent years, transport policy in Rio de Janeiro has been implemented through the construction of infrastructure and large transport projects with the aim of reorganizing the intraurban mobility system. Such a policy can be considered a response to the collective perception of the existing mobility crisis, mainly characterized by the increase in automobile dependency, lagging behind the promotion of policies addressed to the modes of active transportation, such as the bicycle – despite the quantitative advances that have occurred in recent years.

There is also, as we have said, an appropriation of the bicycle's discourse by various social actors and public agents, but with no effective actions for its use as a mode of transport, despite the increase of its use in daily commutes. Data from the recent report of the *Associação Nacional de Transportes Públicos* [National Public Transport Association] – *Sistema de Informações da Mobilidade Urbana* [Urban Mobility Information System] – *Relatório Geral 2014* [2014 General Report], published in July 2016, indicates that non-motorized transports (walking, cycling or animal-powered) correspond on average to 40% of commutes in Brazil. According to this same report, the number of bicycle trips more than doubled between 2003

³⁵ According to some news released by *Agência Brasil*, of the *Empresa Brasileira de Comunicação* [Brazilian Communication Company]:

<[http: agênciabrasil.ebc.com.br/geral/noticia/2015-09/com-reducao-da-velocidade-acidentes-nas-marginais-tiete-e-pinheiros-caem-36=>](http://agenciabrasil.ebc.com.br/geral/noticia/2015-09/com-reducao-da-velocidade-acidentes-nas-marginais-tiete-e-pinheiros-caem-36)>. Accessed Oct. 18, 2016.

and 2014. Despite this, its weight in the mobility system is still low compared to other modes, even considering that its slice in the modal division has increased from 2.4% to 4.1% of commutes.

It must be emphasized that the ANTP survey data reveal that the weight of the bicycle varies according to the population size of the city. In cities with a population between 60 and 100,000 inhabitants, up to 14% of the commutes are carried out by bicycle, while in cities with more than 1 million inhabitants this number falls to 1%, on average. One of the possible explanations for this is the size of the city itself, where, of course, the distance to be travelled on daily trips is bigger. It is worth remembering that, in general, Brazilian cities have low density population, and Rio de Janeiro has 5,265.81 inhabitants per square kilometer³⁶.

Thus, the urban configuration characterized by low density could be considered a first factor for inhibiting the use of the bicycle as a means of transportation. Even so, bicycle-sharing trips carried out in the city of Rio de Janeiro are three times greater than the average of the cities with population with more than 1 million inhabitants. According to information from the latest Origin-Destination survey held by the State Government (2013), this percentage is around 3.2%.

It is true that in the case of Rio, many neighborhoods are more than 20 kilometers away from downtown, especially those located in its Western Zone that reach impressive 64 kilometers as is the case of Santa Cruz. This is a case that well exemplifies the typical commute in Rio de Janeiro, that is, the pendulum movement towards places with concentration of employment (Downtown, Barra da Tijuca and the Southern Zone). These distances are in general hardly accessible to cyclists even when there is good cycling infrastructure, a fact that does

³⁶ 2014 IBGE data.

not occur in the Downtown-Western Zone axis or even in shorter axes, such as in the Tijuca-Downtown or São Cristóvão-Downtown cases.

The self-proclamation of the city as the “Urban Capital of Bicycle Mobility”, which denotes the idea of vastness and completeness, hides several deficiencies indeed. One of the main issues is that there is no configuration of a cycling network; the digital map of bike paths of Rio de Janeiro, available at the city hall site³⁷ and updated regularly, shows clearly the concentration of the cycling network in the Southern Zone of the city, a haven for large part of the higher income and high social status population and a region that concentrates, in proportion to its size, the largest supply of transportation infrastructures.

In the central area of the city – where jobs are – the number of bike paths is quite limited, although there are partially implemented projects (for example the *Ciclo Rotas* [Cycle Routes]) aiming to structure an intra-neighborhood network and its connection with the Southern Zone via Aterro do Flamengo. As an example of the lack of network, we can cite Fundão Island, where the Universidade Federal do Rio de Janeiro (UFRJ) [Federal University of Rio de Janeiro] is located, and Governador Island, where Tom Jobim International Airport is located, two fundamental pieces of equipment for the urban dynamics of Rio de Janeiro. In these locations, despite their bike paths, nets are not continuous and are isolated, disconnected from any other bike path in the city. In other words, to enter or leave one of the two islands, cyclists rely on public transportation in which bicycles are not allowed, or on the dangerous dispute with the cars in highway lanes that connect these islands to the rest of the city.

In the Northern and Western zones, the situation is quite different. In the former, there are practically no bike paths. In the latter, there are

³⁷ Available at:

<<http:pcrj.maps.arcgis.com/apps/webappviewer/index.html?id=5005177263f44932b87564b4fb8defdc>>. Accessed Oct. 03, 2016.

bike paths, but paracycles and bike parking racks are scarce. Only on the Western Zone waterfront, prominently in Barra da Tijuca, there is a bike path covering its overall extension, which corroborates the perception that still in Rio de Janeiro the bicycle is seen more as a leisure equipment than a vehicle for everyday mobility.

This perception can be further reinforced since intermodal subway stations, buses and BRTs, for the most part, do not have bike parking racks³⁸, which also inhibits bicycle use. Besides, with no bike parking racks, when the bicycle is used, it is necessary to leave it unattended, locked up in irregular places, vulnerable to vandalism, which worsens urban landscape quality and eventually accessibility to these stations.

In addition to the issues regarding the bike path network and the lack of possibility of intermodal integration, the general framework of the cycling policies of Rio de Janeiro has other discouraging elements for those who wish to use the bicycle as a means of transportation. Given this panorama, in 2016, the Secretariat of the Environment of the City of Rio de Janeiro began the discussions for the elaboration of the Master Cycling Plan, based on a research on Rio de Janeiro's cyclists, with the aim of expanding the discussions on infrastructure supply and improving the existing infrastructure.

However, a problem lies there. The city's mobility system is managed by the *Secretaria Municipal de Transportes* (SMTR) [Municipal Secretariat of Transportation], and the great executioner of public works is the *Secretaria Municipal de Obras* (SMO) [Municipal Secretariat of Public Works]. However, we have noted in Rio de Janeiro a great lack of coordination of the cycling mobility guidelines, since the

³⁸ See: "Ciclistas usuários do BRT no Rio reclamam de falta de bicicletários". G1, Sept., 2014. Available at: <<http://g1.globo.com/rio-de-janeiro/noticia/2014/09/ciclistas-usuarios-do-brt-no-rio-reclamam-da-falta-de-bicicletarios.html>>. Accessed April, 2015.

discussion is chaired by the Secretariat of the Environment (SMAC), and the city's bike paths have been mostly implemented by this secretariat, by RioUrbe - *Empresa Municipal de Urbanização* [Municipal Urbanization Company], and also by companies such as Rio Águas and GeoRio. Therefore, the provision for cycling infrastructure is helpless and with no connection to the secretariat that manages the city mobility system, the SMTR.

From this scenario it is possible to see an essential – but unfortunate – aspect of the urban transport policy in the city. The absence of topics related to the issue of active transportation in the discussions of the governmental body that organizes the mobility of the municipality of Rio de Janeiro denotes the little importance given to the theme in the context of the municipal government. It is a theme, therefore, relegated to the background, thus suggesting that, from the perspective of the municipal public power, cycling is an action more related to the discussions of a secretariat that does not have urban mobility as a central theme.

Cyclist profile: Who uses the bike as a means of transportation in Rio de Janeiro

Who is the Carioca cyclist? This is one of the questions that the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015) intended to account for. Obviously, it is not a simple question because, as it happens with our society, the set of bike users in Rio de Janeiro is not homogeneous. We could venture to say, even, that the set of the cyclists of a city mirrors this very society – with its overall contradictions, conflicts and inequalities.

However, with the “Profile” survey data it is possible to capture important traits and details of the population that uses the bicycle as a means of transportation, perceiving its peculiarities, but, above all,

pointing out prevalent characteristics, those that precisely show “its face” or, in other words, allows its profile to be outlined.

In the first place, following the trend of other cities and following the results regarding Brazil, in Rio de Janeiro there is a higher concentration of cyclists aged 15-44 years, and 28% are only aged 25-34 years. Even with the prevalence in these ranges, we could point out that the Carioca cyclist profile shows a little more aged population compared to the country as a whole. As you can see in Chart 7.1, the relative presence of cyclists in the age ranges over 45 is higher, approaching the percentage of Brazil only in the age range of 64 years or more.

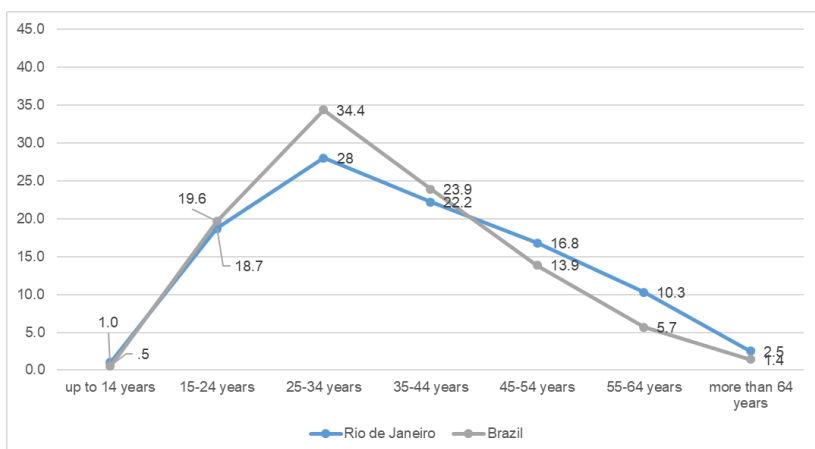


Chart 7.1. Brazil and Rio de Janeiro: Urban cyclists according to age range (2015). Source: The authors' elaboration with data from the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

In Rio, most cyclists earn less than two minimum wages. Of these, 12.9% have an income up to a minimum wage, while 30.7% have an income between one and two minimum wages. On the other hand, only 4.2% have incomes exceeding ten minimum wages, which for the city and country standards could be considered a high income. Still in this

regard, the Carioca cyclist profile is very close to the average of Brazil. However, it is important to highlight the income range between five and ten minimum wages, in which the percentage of cyclists in the country as a whole is considerably higher than in Rio.

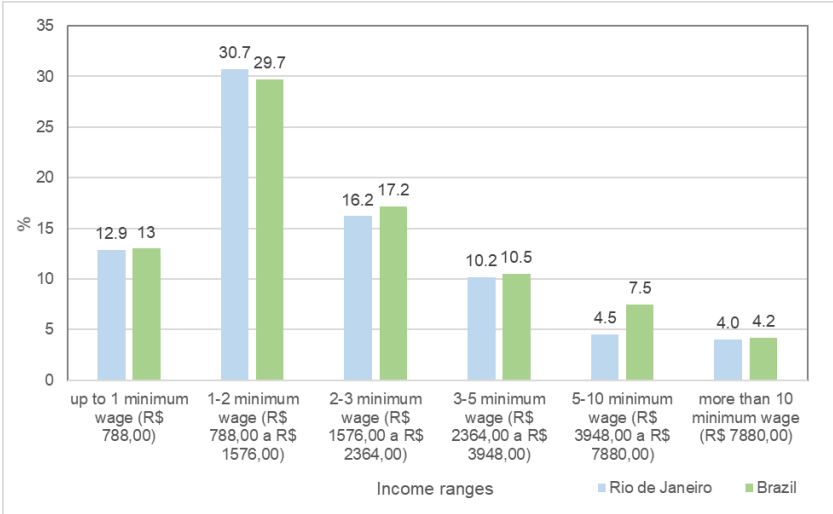


Chart 7.2. Brazil and Rio de Janeiro: urban cyclists according to income range (2015). Source: The authors’ elaboration with data from the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

Differences in Brazil and in other cities give to the schooling variable an important perspective to better understand the Carioca cyclist profile. Compared to Brazil, and even to other Brazilian cities, the Carioca cyclist schooling can be considered low. According to the survey data, while in the country the number of post-graduate cyclists corresponds to 5%, in Rio de Janeiro this number is 3.5%. Observing the cyclists with higher education, the difference is even greater. In Brazil as a whole, 23.6% of cyclists reported to have higher education. In Rio, this percentage is 16.3%. In order to get an accurate picture of

the current situation, in São Paulo the percentage of cyclists with higher education is 30.2% and with post-graduation is 6.3%³⁹.

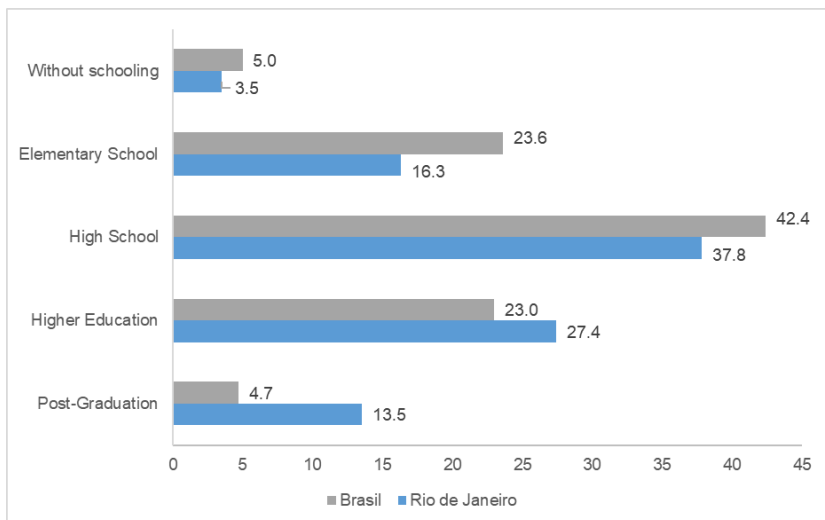


Chart 7.3. Brazil and Rio de Janeiro: urban cyclists according to schooling (2015). Source: The authors' elaboration with data from the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

The use of the bicycle as a means of transportation involves a complex web of positive and negative relationships between characteristics, preferences and individual needs, facilities and urban amenities. However, we consider that for understanding this use and these relationships we have first to describe and understand these fundamental traits that outline the Carioca cyclist profile revealing, as we have seen, a more aged population with less income and schooling, which can determine the way the bicycle is used in the city.

³⁹ Data from Brazil and the other cities surveyed can be found in greater detail in the report available at: <<http://www.ta.org.br/perfil/ciclista.pdf>>. Accessed Oct. 06, 2016

Characteristics of bicycle mobility in Rio de Janeiro: intermodality, commuting time and safety

The survey data entitled the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015) also show that, of all the people interviewed, 27% informed to use the bike 5 days a week and 37.2% used it 7 days a week, revealing, as the first characteristic of bicycle mobility in Rio de Janeiro, its intense use as a means of transportation. Conversely, the percentage of those who used it 1-2 days a week just reached around 5%. Frequency of bicycle use shows a curious relationship with age. Among those who used the bike 5 days a week, the percentage is higher among people aged up to 34 years. Among those who are up to 14 years old, for example, 50% claimed to use the bike 5 days. On the other hand, the percentage regarding cyclists who use the bicycle 7 days a week was higher in higher age ranges: 68% among the people aged 55-64 years and 75% among those aged over 64 years.

It is already known that there is a strong correlation between schooling and income. However, when we seek the relationship of these variables with the frequency of bicycle use, we find slightly different trends. The intersection between income and the amount of days per week shows that people with lower income tend to pedal more days. Cyclists who pedal 7 days a week account for 55.2% of those with income less than a minimum wage, against 17.9% of those with income above 10 minimum wages. On the other hand, most post-graduate people (people we can assume are also high-income people), use the bike for up to 5 days a week, while most people without education and people with elementary school use it 6 or 7 days a week.

These data allow a reading that the bike, due to the fact that it is a cheap equipment, has a wide access to places, a low maintenance cost, is a viable option for the commutes of the poorest population. This reading derives from the fact that the highest percentage of people who

extensively uses this modal is the low-income cyclists who earn less than a minimum wage. The explanatory strength of these features so far as bike use is considered for transportation, as we have seen, seems to be even more present in Rio de Janeiro.

One of the ways to observe the behavior of bicycle use in large cities is the intermodality allowed by large infrastructure equipment. According to the survey data, in Rio de Janeiro, only 34.8% of the interviewed cyclists use the bike in combination with another mode of transport in their weekly trips.

Another important aspect to consider when approaching intermodality is the fact that 56.6% of cyclists have a travel time from 10 to 30 minutes, in opposition to 13.3% that spend from 30 minutes to 1 hour and only 2.1% that spend more than 1 hour on the bike.

Bicycle use as a component of urban trips, from home to the intermodal station or from the station to the final activity, corroborates the response that the bike is more convenient and faster (52% of the responses to the question “Main reason to continue using the bicycle as a means of transportation”).

In this way, it is important to think of policies that will allow the inclusion of portions of the population that could use the bicycle to longer commutes but who do not do so because of the time they would spend. A good urban mobility policy would be the creation of a provision addressed to the integration of these bicycle commutes with other modes, especially in the peripheral areas of the city more prone to the large pendulum movements towards the places of employment. However, the implementation of good cycling networks in these neighborhoods, which will enable passengers on buses and subways to use the bike in the shortest commutes, will bring a great gain of time, comfort, and all other benefits associated with bicycle use.

The average commuting time by bicycle in the city of Rio de Janeiro is 22.7 minutes. Much of the people who use the bicycle in Rio de

Janeiro carry out their commutes within 30 minutes (83.6%), with commuting time of 10-30 minutes reaching 56.6%, which is very close to the average of the entire country. The final destinations of the trips do not seem to impact on commuting time, there are no major differences in the average time if the cyclist uses the bicycle to go to work, to school or to shopping.

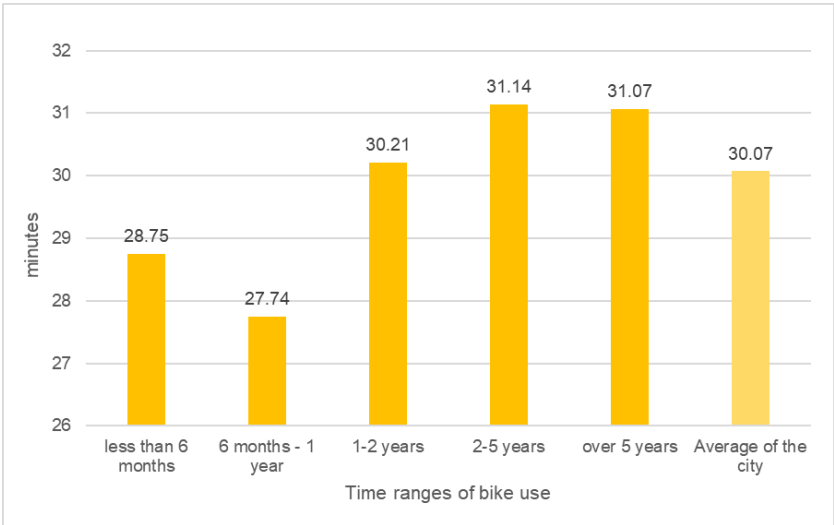


Chart 7.4. Rio de Janeiro: average commuting time according to the time of use of the bicycle as a means of transportation. Source: The authors' elaboration with data from the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

However, we find a certain relationship between the average commuting time and the time of use of the bicycle as a means of transportation. As you can see in Chart 7.4, people who have used the bicycle for a long time tend to have a higher average time. Those who have used the bicycle for more than five years, for example, have average time of 31 minutes, against 28.7 of those that have used the bicycle for less than six months or, still, against the 27.7 of those that have used the bike for more than six months and less than one year. A

possible interpretation is that the experience of having cycled for a long period of time can promote ambiance and increase of safety, which encourages the bike user to stay longer on the bike.

Why the Carioca uses the bicycle as a means of transportation: motivations, limitations and possibilities

From the survey data from the “Brazilian Cyclist Profile” (TRANSPORTE ATIVO, 2015), it was also possible to examine the motivations, limitations and possibilities of the use of the bicycle as a means of transportation in the city of Rio de Janeiro. In terms of motivations, we can approach the survey from two dimensions: a) the practical motivation that leads people to choose it as a mode, that is, the bicycle is used in their daily trips: commute to work, to the school, to the places of shopping and social gatherings; b) the subjective motivation that leads people to adhere to bicycle use in their daily commutes: because it is environmentally correct, cheaper, healthier or faster and more convenient. With regard to preference, the survey investigated the reason why the cyclist continues using the bike, which also brings some idea of the perception of the motivations for its continuous use over time.

When we analyzed the motivations for bike trips according to destination, the prevalence of people using the bike to commute to their workplaces stood out, corroborating the national results. However, the results shown in Chart 7.5 reveal that in Rio de Janeiro the percentage of the people using the bike for this reason (71%) is less than the average of the country (75.2%). On the other hand, the results seem to derive from the characteristics of the city itself. In Rio, the percentage of people who use the bike to commute to social gathering places (meeting with friends, theaters, cinemas, etc.) is much higher than in other cities.

In the same chart is shown that in Rio the percentage of people who use the bicycle to commute to school/college is 12.6%, a value that calls our attention because it can be considered low when compared to Brazil (17.9%) or even to other cities such as São Paulo, where the percentage is 15.1%.

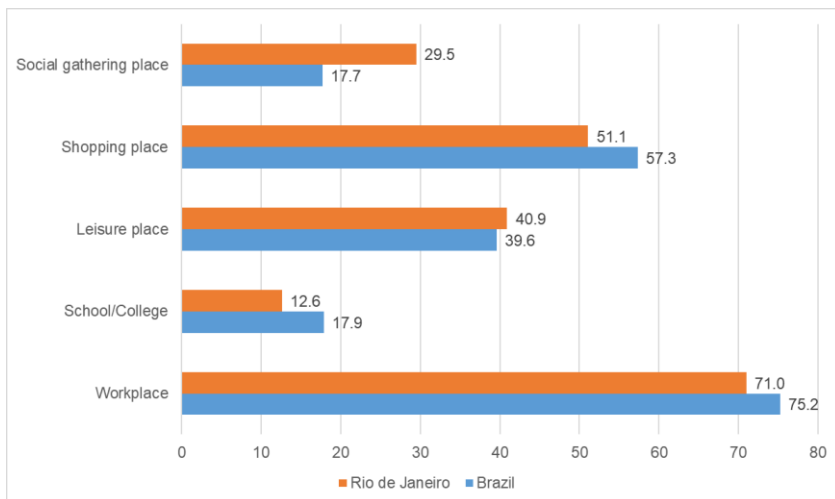


Chart 7.5. Brazil and Rio de Janeiro: cyclists according to destination (2015). Source: The authors' elaboration with data from the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

When we analyzed the subjective reason for the cyclist to use the bike in his daily commutes in Rio, we found some differences in relation to the national results indicating further relevant aspects of the Carioca cyclist behavior. The first one is in the hierarchy of reasons. The Carioca pointed out that the fact of the bike being faster and more convenient was the main reason for using this vehicle, and its aspect of being healthier than the other modes of transport appeared at the second position. In the case of Brazil, although convenience and speed were

considered the main reason, the fact of being a cheaper means of transportation appeared at the second position.

This means that the user of the bicycle in Rio de Janeiro tends to assign a greater importance to this vehicle as a promoter of health and individual wellbeing. Data contained in Chart 7.6 show that while in Brazil 18.6% of the interviewees considered the bike a healthier means of transportation, in Rio de Janeiro this percentage reached 24.4%. On the other hand, although the difference is less pronounced, the Carioca seems to assign less value for speed and convenience in comparison to other cities, since of all the people interviewed a total of 38.2% pointed out this reason, while in Brazil this percentage reached 42.6%.

These data lead to the perception that Cariocas tend to focus more on the health and wellbeing effects than the national average, a fact that attests that Rio de Janeiro is a city where the call for sports and health is more present in the daily lives of citizens, which is also applied to their relationship with bike mobility.

Survey data also show that there is a dynamic configuration regarding the reasons to start using the bike as a means of transportation and the reasons to continue cycling. There is, in fact, an exchange of reasons. In this exchange, the fact that it is faster and more convenient is the most mentioned motivation, as clearly shown in Chart 7.6. In addition, it is possible to see that some reasons seem to have gained greater importance while others seem to have lost it. More people highlighted the bicycle as environmentally correct and more convenient and faster, while its features of being cheaper and healthier were less mentioned and seem to be less important when compared to the motivations for continuing using the bicycle as a means of transportation in the city of Rio de Janeiro.

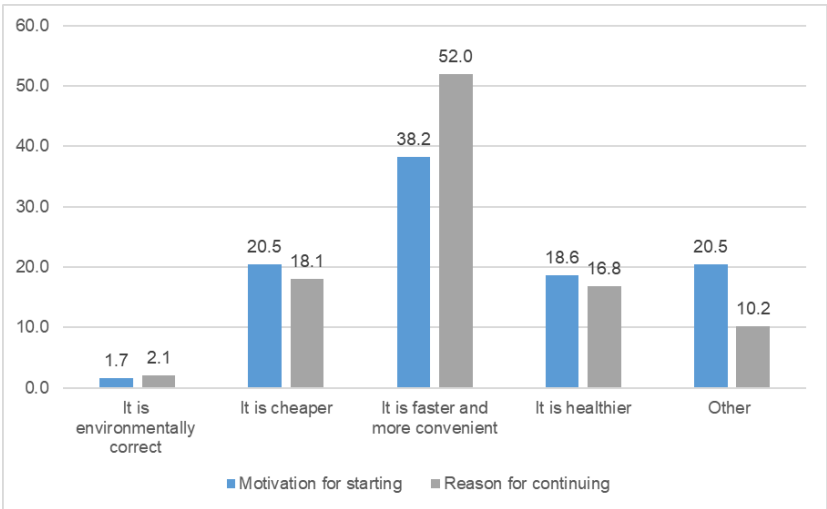


Chart 7.6. Rio de Janeiro: motivations for starting using the bike and for continuing using it as a means of transportation (2015). Source: The authors' elaboration with data from the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

To better understand this trait of the Carioca cyclist behavior, we developed a kind of matrix with the origin and “destination”/permanence motivations. As a result, it is possible to know not only how many cyclists have changed their perception, but how and in what sense this perception has been changed.

The choice for cycling as a mode of transport because “It is faster and more convenient” is not only the main reason to start using the bike and the main reason to continue cycling, but is the most consistent one, since in the exchange dynamic mentioned earlier, it is the one that shows no change and has the highest percentage: 73.2% of the interviewees claimed that it was both a motivation to start cycling and to continue cycling. In Table 7.1, the yellow quadrants display this percentage for the other motivations/reasons. As it can be seen, the “environmentally correct” option had the highest percentage of

“abandonment”, since only 33.3% of the interviewees in Rio de Janeiro simultaneously pointed this aspect as their motivation and reason for starting using the bike and for continuing using it.

On the other hand, of those who started cycling because they considered the bike a healthy mode, almost half (48.6%) continued using it because they started seeing this vehicle as a faster and more convenient means of transportation. This may result from the general condition of the city’s urban mobility that has had an increase in the average commuting times in recent years mostly due to congestion⁴⁰.

		Origin Reason				
		It is environmentally correct	It is cheaper	It is faster and more convenient	It is healthier	Other
Destination Reason	It is environmentally correct	33.3	6.7	26.7	26.7	6.7
	It is cheaper	1.5	53.8	35.5	8.6	0.5
	It is faster and more convenient	1.4	9.0	73.2	12.6	3.8
	It is healthier	2.8	3.4	48.6	40.2	5.0
	Other	1.0	12.7	36.5	12.2	37.6

Table 7.1. Rio de Janeiro: reasons for starting cycling and for continuing cycling – 2015. Source: The authors’ elaboration with data from the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

In this article, we consider limitations the issues mentioned by the interviewed cyclists, specifically those faced in their daily bicycle use: lack of infrastructure, lack of respect for cyclists by motorized drivers, lack of traffic safety, lack of public safety and lack of signaling. Despite having been proclaimed the “bicycle capital” by the municipal public power, and despite its more than 400 kilometers of bike path, the lack

⁴⁰ In the metropolitan area of Rio de Janeiro, there has been an increase in the number of people who spend more time in their commuting times between their households and work/school (more than 1 hour) and an increase in the average time spent in commuting, as reported by the work of Pereira and Shwanen (2013).

of adequate infrastructure (bike paths, bike parking racks, etc.) is pointed out by most of the interviewed cyclists as the main barrier to the use of the bicycle as a means of transportation in the city of Rio de Janeiro. But unlike Brazil and other cities, the lack of infrastructure divides its position in the ranking with the lack of respect for cyclists by motor vehicle drivers (28.8%) and the lack of safety in traffic (25.6%). To have an idea and a comparison parameter, both in Brazil and in São Paulo, the main issue is considered the lack of respect for cyclists by motorized drivers and not the lack of safety, with percentages of 34.5% and 36.4%, respectively.

It is essential to state that the survey data show that what can keep cyclists off the streets in Rio de Janeiro is far from the lack of public safety (bike theft, for example), as the voices of common sense want us to believe sometimes. In Rio, only 10.5% of the people interviewed showed concern about this issue. This finding reinforces the understanding that the promotion of bicycle use as a means of transportation relies more on urban mobility policies, specifically on adequate infrastructure provisions, and on the organization and education in traffic.

The possibilities of increase in bicycle use as a means of transportation, in turn, were calculated taking into consideration aspects that, according to the respondents, would make them cycle more often and which would somehow solve the highlighted issues, namely more cycling infrastructure, more safety against robberies, more traffic safety, better parking and afforested streets and bike paths. In this regard, the results are in parallel with the perceived issues. In Rio, 57.6% of the interviewees pointed to the need for more cycling infrastructure as a factor that would make them use the bike more frequently, against 49.8% in the entire Brazil. To a lesser extent, more traffic safety (14.8%) and more safety against robberies (13.3%) emerge as less important factors. Nonetheless, the reasons that would lead

people to more frequency in the use of the bicycle as a means of transportation can vary according to the cyclist's features. For people in higher age ranges, more infrastructure provision would be an even more important factor. Among those aged between 55 and 64 years, for example, 66% said they would cycle more frequently if there were more infrastructure. On the other hand, safety against robberies would be a more relevant factor for younger people, especially those aged up to 14 years, of which 20% highlight this factor as the main barrier for cycling. Finally, it is worth highlighting that the type of demand also varies according to the cyclist's experience. The need for more infrastructure prevails over the overall demands. In addition, it is interesting to note that the claim for more safety against robberies tends to decrease as the time of bicycle use increases as a means of transportation. Among those who have used it for less than 6 months, a total of 18% claimed more safety against robberies, while among those who have used it for more than 5 years the percentage is only 11.7%, lagging behind, for example, the demand for more traffic safety (14.4%).

Final Considerations

It is true that the results of the national survey entitled the Brazilian Cyclist Profile offer new possibilities for research and arouse more doubts than certainties about the intricate network of the relationships established between the individual-cyclist, with his/her desires and needs, and the city, understood as a space with contradictions and conflicts.

However, when we assessed the cyclist profile, the motivations, the limits and possibilities of bicycle use in the city of Rio de Janeiro, we were able to approach – with relative degree of certainty – the challenges for bike mobility in the city. We have seen that although most infrastructure is concentrated in higher income and social status

areas (Downtown, Southern Zone and Barra da Tijuca), the Carioca cyclist profile tends to be more popular. That is, his/her main features are in productive age, strong presence of workers with less income and schooling. Issues are mostly concentrated in cycling infrastructure deficiency. These issues, in turn, have not completely inhibited bicycle use as a means of transportation in the city. Part of the Carioca cyclist's routine is to circumvent these issues every day, although the lack of infrastructure, public safety and motorized traffic are set up as strong concerns that generate legitimate and necessary demands.

Obviously, the investigation on bicycle use as a means of transportation in the city of Rio de Janeiro does not stop here, much less the possibilities of exploration of data from the survey on the Brazilian Cyclist Profile, held in 2015. This article brings a first exploration of these data, but further investigation on the cyclist profile and bicycle uses is being carried out by several entities interested in promoting bike use as a viable mode of transport in the city.

The analysis of the cyclist profile shows that there are still many gaps to fill, such as the incorporation of higher income and higher education people into the cyclist public so that the provisions for the adoption of the bicycle as a mode of transport will help transforming Rio de Janeiro in a city where public spaces – the street, in particular – will be more democratic and less dominated by private motorized vehicles.

We believe that for achieving this goal, knowledge production – which aggregates the university, the civil society organizations and the public power – is essential. Thus, with the results discussed in this article, we hope to actually collaborate to the promotion of effective actions that shall foster bicycle mobility in Rio de Janeiro.

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Chapter 8. The collaboration of cyclists for the construction of territoriality

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Introduction

The way we move in urban space has always been an important determinant of the city shape. As well as the free space needed to ventilate and illuminate the rooms of a building, the dimensions of the modes of transport have always influenced the planning of new streets and avenues, even in the decision to demolish many of them, as it is clear when we observe the history of the largest capitals.

The first bike paths of some North American cities - Brooklyn and Los Angeles - and European - Utrecht and Copenhagen - date back to the late 19th and early 20th centuries. In Rio de Janeiro, the discussion and construction of the first Carioca bike paths, usually associated with the coastal area of the municipality and addressed to leisure purposes, only began at the end of the 20th century, in the 80s and early 90s. At the same time, cities like New York and Copenhagen had already a structured bike path network and had invested in data collection, producing analyses and setting goals for improving urban mobility through the bicycle. If we look at these conditions from a historical standpoint, we realize that we are still at the beginning of a process of knowledge construction about the use of bicycles as a means of

transportation in Brazil. However, we are experiencing a moment of maturity; a transition between the empirical and the scientific as regards the bicycle as a mode of transport. We are faced with the challenge of understanding what will be the contribution of utilitarian cycling to Brazilian cities, but we must go beyond. We need to measure, analyze and know the efficient means to improve our locomotion through the city space.

In Rio de Janeiro, when we look at the plans of the municipal government in the major reforms carried out by Pereira Passos, in the first major demolitions, such as the opening of Rio Branco Avenue and the Cruz Vermelha Square with the axis created by Passos Avenue, it is possible to observe the concern with the space for electric trams, carriages and large afforested walks. A few decades later, in 1928, the Agache Plan proposed the opening of new major avenues, such as Presidente Vargas Avenue, and the creation of a subway system. In Agache's view, the subway stations would always be composing centralities along the main squares and esplanades, such as those of Castelo and Santo Antônio, while the avenues for vehicles would be away from these centralities. In the 40s, plans for the city of Rio such as that of Saboya Ribeiro and Affonso Reidy no longer illustrated the presence of trams or subways, although the former highlighted the importance of the subway system in its project memorial.

With the growing automotive industry, mainly in Juscelino Kubitschek government (1956-1961), the paradigms of quality of life in the United States have gained strength in Brazil and the ideal lifestyle built around the idea of a freedom resulting from the ownership and from the daily use of an automobile prevailed upon the idea of sharing a tram seat.

Since then, public transport in the city of Rio de Janeiro, and consequently the planning of urban spaces, have been designed with a priority focus on the use of the automobile, and in the case of public

transport, buses, which would share the same space in the street. As an example of this guideline, the 1965 Dioxiadis Plan stands out as it created several of the large highways destined for cars that today serve the city of Rio. The first of these, the *Linha Lilás*, that is currently the 31 de Março Avenue, caused a great impact on the neighborhood of Catumbi during its implementation, described and criticized by Carlos Nelson dos Santos and Marco Antônio Mello in “*Quando a rua vira casa*” [When the street turns into a home] (SANTOS et al., 1985).

This fact occurred not only in the former federal capital but also in the main Brazilian cities, where the tram system was replaced by buses, and the urban trains system fell into decay. More and more, the ownership and daily use of private cars were encouraged, and the motorized transport gained ground. However, buses occupy a space higher than trams, their load on paving is also superior and their combustion engines generate more noise and smoke, that is, their impact on the urban environment is far superior than that of their predecessors. Passenger cars, used by very few people when compared to public transport vehicles, demand even more space in the streets.

Thus, the paradigm shift in the transport system caused a great impact on the city shape and use. From the 1960s until the end of the 20th century, while the population doubled in size, the occupation of the city territory tripled. In places with higher density, the city has missed afforested sidewalks and flowerbeds, and even historical buildings, aiming to make way for wider lanes capable of accommodating buses and, mainly, parking for private vehicles. In sprawled areas and without density, both the long distances and the feeling of lack of safety⁴¹ inhibit the use of the street and, therefore, the act of walking and cycling.

⁴¹ For Alexander (2013), the urban space needs at least one person every 15m² to be considered “animated”, while for Jacobs (2003) the sidewalks must have people transiting continuously, and the separation between public and private space should be clear. Suburbs represent the opposite of these concepts.

From the beginning of the 1970s up to the end of century, Brazilian automobile industry slowed down, affected by the oil crisis, reduced credit and increased taxes at first. As early as the 90s, it was forced to modernize itself because of the trade opening of vehicle imports. These were the foundations for a more competitive national industry and an accelerated growth of new brands in the country, despite cheap labor, supply of water for industrial production and tax exemption policies. These factors made passenger cars more affordable in general and contributed to their popularization.

At the beginning of the 21st century, the automobile industry took a big step forward, anchored in three main factors: increase in the population income, especially of the average income population; tax reductions of the federal government to encourage the automobile industry; and credit facilities promoted by the reduction of policy interest rates.

Currently, the Brazilian automotive market occupies the eighth position in the world ranking, lagging behind China, the United States, Japan, Germany, South Korea, India and Mexico. But it is still ahead of important markets, like the Canadian market, for example. According to the *Instituto Nacional de Ciência e Tecnologia* (INCT) [National Institute of Science and Technology] Report of the *Observatório das Metrópoles* [Observatory of Metropolises], between 2001 and 2012 the number of cars in the 12 Brazilian metropolises increased from nearly 24.5 million to 50.2 million. If we consider the overall growth in this period, 14.6% took place in 2012. In the same period, the numbers of motorcycles increased from 4.5 million to 19.9 million. This accounts for a 78.3% increase in cars and an alarming 339.5% increase in motorcycles. On average, more than 890,000 cars were added per year during that period.

In Rio de Janeiro it was not different. Despite presenting a relative increase lower than the national and metropolitan averages, Rio de

Janeiro recorded a considerable increase. Between 2001 and 2012, the city fleet grew by 73.1%, which accounts for nearly 1.2 million of cars.

The impact of the overall vehicles on the territory has become increasingly difficult to manage. Prioritization of the motorized individual transport to the detriment of the collective forms of commuting triggered a mobility crisis in the Brazilian metropolises which, associated with other issues, led to the demonstrations of June 2013.

The demand for road infrastructure space is very high. Cars need a lot of space not only to circulate, but also to park while waiting for their exclusive passengers. Currently, it is still socially accepted that any supposedly available space in traffic routes can be occupied by a vehicle for parking. We are used to seeing cars in every corner of the city, along the sidewalks, in most of the roads, especially in local traffic roads. Thus, the public space of the city is at the service of few cars, even when its potential use is much higher⁴².

Fortunately, transportation planning seems to undergo a shift in the way problems and solutions are defined and evaluated. According to Littman (2013), while conventional planning had as its main objective the maximization of speed and, consequently, of the distance travelled, it was a model that was mainly based on commuting itself⁴³. However, trips and commutes seldom have the route itself as a purpose⁴⁴. In general, the main objective of the daily and pendulum commutes in urban environments is related to accessibility, not to mobility as an end, but rather to the capacity of people to access the services and activities

⁴² Initiatives such as the *Parada Carioca* in Rio de Janeiro, which consists in converting the space destined for parking on the roads in public use space, signal the implementation of this potential.

⁴³ Based on this model, transport policies were implemented in Brazil and in Rio de Janeiro.

⁴⁴ As an exception, we can cite the trips and commutes whose main purpose is tourism, when the route itself is the purpose.

desired. It is towards this direction that the current efforts of territorial planning seem to go.

Models focusing on commutes evaluate the performance of a transport system based mainly on speed, number of passengers, kilometers travelled and travel cost. Within an accessibility-based approach, speed in commuting is just one of the factors that impact on general accessibility. The focus is on accessibility to goods, services and activities that can be measured through accessibility indices and global costs, considering multimodality. The most common indicators are the quality of the available transport options, destination proximity and the transportation cost *per capita*. In this way, management projects and strategies seek to increase the overall performance of the transport system.

This scenario helps to highlight the importance of the use of bicycles as a means of transportation in the major Brazilian cities, and in Rio de Janeiro as well. From this mobility crisis emerged a movement that encourages cycling utility, consisting in the use of the bicycle for purposes other than leisure or tourism. But not just this. The bike is also reborn as a measure of urban planning, both from a territorial and a social point of view.

Another structuring and defining element of the territorial planning units are, for example, river basins. The water path is a transforming space element, both from a geomorphological point of view and from an ambience and habitat point of view.

Rainfall regimes are difficult to foresee, but the geomorphology of the areas in which they concentrate is completely tangible, making possible to anticipate which areas are more prone to flooding and which are more prone to sliding. River basins define centres and borders from a territorial point of view and have very distinct scales; in some cases, they reach continental scales such as the Amazon Basin, for example. On the other hand, they are more common on neighborhood unit scales

and on neighborhood scales. The lack of knowledge on this matter, and the ways it imposes itself upon human arrogance, has resulted in tragic situations that occur with invariable frequency.

The spatiality built by bike use on the neighborhood scale, in view of the survey data, closely resembles the dynamics of water in micro river basins. It belongs to the spatial physical dimension of the neighborhood and achieves its completeness in it. But bike use has an amazing advantage when compared to the dynamics of water as it has a high level of predictability.

In this sense, the following paragraphs outline some reflections and observations aiming to better understand the cyclist contribution to the configuration of the territory based on the survey on the “Brazilian Cyclist Profile”, having Rio de Janeiro in the background.

The Case of Rio de Janeiro

Rio de Janeiro has a huge potential for developing bicycle use as a means of transportation. Currently, the city has the second largest network of bike paths in the country with about 380 km of bike paths, lagging only behind Brasília. External factors such as climate and relief do not prevent bike use, as usually claimed by common sense. Throughout most of the year, the climate for cycling in the city of Rio de Janeiro is usually favorable. Although having an annual precipitation more than twice as much as that of Copenhagen - where there is one of the largest rates of utilitarian cycling in the world – the city has almost two months without rainfall and an average annual thermal variation in the 20°C range. But summer, with its warm and humid days, is an issue in Rio de Janeiro regarding its climate.

Regarding relief, the city is squeezed, on the one hand, between the Atlantic Ocean and the massifs of Tijuca and Pedra Branca that can represent large geographical barriers to be crossed and, on the other, it

extends to the plain of the Rio de Janeiro lowlands, called *Baixada Fluminense*, with other sprawling municipalities in the metropolitan area. The city geographical features directly affect its urban form, which influences and defines the city's road layout. Many connections between neighborhoods are made through tunnels or elevated highways, triggering some situations in which socio-spatial conflicts between the different agents of the city space tend to be larger. These are specific points that deserve special attention from planning and urban design. The rest of the city's territory can be the object of some typical solutions that would favor the use of the bike as a means of transportation.

When we look at cities like New York, London and Copenhagen⁴⁵, where bicycle use has increased and has been maintained by the deliberate action of an urban policy both at the local and national level, we realize that a common premise is the collection, analysis and monitoring of related data. It is necessary, therefore, that this emerging process in Brazil is encouraged and continued, aiming to build a reliable database that shall assist the overall agents involved in decision making. Only then it will be possible to set numerical goals, evaluate the results of the projects implemented to promote adjustments in infrastructure and to plan better future interventions.

Despite the apparent potential of the city for developing bicycle use, until recently, the quantity and quality of the data available for analysis were scarcely accessible and reduced. Thus, we can assume that the success of what has been implemented and produced to this day results from Rio's vocation for this mode of transport. It is not possible to say

⁴⁵ New York, London and Copenhagen are cities where the mapping and availability of data about utilitarian cycling are systemically done and have been improved since the end of the 20th century. In all these cities, annual technical reports on the use of bicycles as a means of transportation are disclosed by traffic departments. Given this, these cities were used as references in this article.

that these decisions were based on substantial data for decisions already taken. It is also not possible to accept that we will intuitively move forward without a database to subsidize future projects for the city of Rio de Janeiro.

In this sense, the survey on the *Perfil do Ciclista Brasileiro* [Brazilian Cyclist Profile] (TRANSPORTE ATIVO, 2015), a result of the survey entitled *Parceria Nacional pela Mobilidade por Bicicleta* [National Partnership for Bicycle Mobility], brings important contribution to the construction of more qualified explanations and interpretations on the use of the bicycle as a means of transportation.

In a brief analysis of the national panorama, the following reflections are pointed out:

- The fact that almost 60% of respondents use the bike 5 to 7 days a week, which highlights the ordinary and everyday nature of this use;
- There is an intense and growing adherence to bicycle use in Brazil, where 61.8% of Brazilian cyclists have used it for less than five years;
- Low bicycle intermodality in the current context;
- Speed and convenience as the most significant criteria in the option for bicycle use and for bicycle maintenance;
- Concern with physical integrity expressed in lack of infrastructure, lack of respect on the part of motorized drivers and lack of traffic safety;
- Predominance of the workplace as the main destination;
- Use lasting up to 1 hour in more than 90% of cases, and up to thirty minutes in 70% of cases, which indicates a local scope, at a neighborhood scale, but in the case of cities such as Rio de Janeiro and Niterói this can also express intermodality;
- An amplitude of age range concentrated in the adult and economically active phase;

- A good level of education in which more than 90% are literate and more than 70% have at least high school level;
- The predominance of income exceeding 1 minimum wage, more than 70% of users; however, with a significant group between 1 and 2 minimum wages, which corresponds to 30% of users.

These are data with various interpretations involving aspects concerning the quality of use, yearnings, frequency, income levels, schooling and above all the territorial nature expressed by bicycle use. Besides, this is an interesting aspect related to the field of architecture and urbanism and some reflections can be made.

It is from this aspect that the act of cycling and walking can develop in us a critical eye directed to the space we live in. Authors like João do Rio (pseudonym of Paulo Barreto), Illich (2005) and Careri (2013) wrote, each in his own way, about the act of walking in the territory configuration.

In his text published in 1908, called *A alma encantadora das ruas* [The enchanting soul of the streets], João do Rio talks about his love of the street and the whole universe of characters, ambiences and events of which the street is the stage, and says:

To understand the psychology of the street is not enough to enjoy the delicacies as one enjoys the warmth of the sun and the lyricism of the moonlight. It is necessary to have a vagabond spirit, full of morbid curiosities and nerves with a perpetual incomprehensible desire, it is necessary to be that which we call *flâneur* and practice the most interesting sport — the art of strolling (JOÃO DO RIO, 1908, p. 2).

In his book *Walkscapes*, Careri (2013) revises the main historical proposals that conceived the act of wandering, or strolling, as a critical

and aesthetic instrument of knowledge, physical modification and symbolic construction of the space traversed. The author traces a history from the earliest nomads to the artists of land art of the years 1960/1970.

Additionally, Illich (2005) explores the energy potentials of the human being as a thermodynamic machine and places the act of walking as the main means through which the human being has set up, altered and constituted the territory in which he lives. However, the author goes beyond when analyzing the potentials of the bicycle. For Illich (2005), it represents the optimal mobility point, allowing the human being to move with maximum efficiency without exceeding a speed limit which, he argues, would corrupt the social environment of the cities. That is, the bicycle maintains, to a lesser extent, the cognitive benefit of perception, recognition and urban investigation, while allowing greater efficiency and speed in commutes.

The way we move around the city directly influences not only the perception we have of the territory, but also the way we interact socially. This assumption reinforces the centrality of mobility as a key aspect of a healthy urban environment. The perception of the individual who is in a car does not capture important aspects of the urban environment. The car keeps the individual away from what surrounds him while creating a controlled and isolated environment for its passengers. Sensory aspects such as temperature, sounds, smells and urban textures that define the ambience of a city go unnoticed when we move within isolated environments. The same goes for the subway, the train and the bus. But the opposite occurs when we move around the city either by walking or cycling.

In addition, according to Navarro (1985), although the bike eventually potentializes commuting when compared to the average speed of a pedestrian, its impact on urban environment is only a fraction of the impact of cars and other means of transport, both when

they are parked and in movement. This factor gives the cyclist, depending on where he circulates, a much higher range of opportunities that a pedestrian can obtain without losing his relationship with the surrounding environment. Unlike a bus or a subway passenger, who is bound to go down only at some specific points, or a car driver, forced to stop at a parking space or to affect road traffic, a cyclist can freely choose where to stop, thus optimizing his opportunities. This can be observed in the surveyed item '*to which destinations you use the bicycle as a means of transportation*', the large slice of the *shopping* item, of 59.2% in the whole country and 60.1% in Rio de Janeiro. This item in the survey, in which the respondent could answer more than one question, can reveal that bicycle trips often have multiple destinations. In other words, we can assume that bike trips can allow many thoughts, such as: "On the way back to work, I will go to the market" or even "on the way to meet my friends, I will leave a book at a friend's house". For a "flâneur", in search of fortuitous encounters, cycling maximizes the possibilities of events for both the individual and the city.

In this way, the bike transcends its characteristic as a mode of transport. Cycling is a way to experience and relate to the city, a powerful tool for the construction of territoriality also from a symbolic point of view.

From the last decades of the 20th century to the current period, technological development has been maximizing commutes of cargo, people and information. We have reduced the time of transfer between points, communications are quite instantaneous, we have shortened the world by accelerating commutes to a dizzying rhythm, incompatible with human biological capacity. It is clear that this is not a process restricted to transport, mobility and communication, but this process finds in them the tangible expression of this new condition. As a result, machines prevail, with large amounts of energy employed,

dehumanizing these processes. It is not a question of trying to make a judgement of value, of trying to understand whether it is good or bad for this article. This is certainly an exciting subject to be developed at another opportunity by other specialists. The fact is that the machines are more competent than us at all things and areas that can be automated, by repetition and use of much energy. But it is not these issues that give us character and identity.

Despite the great technological advances and widespread automation, the recent human valuation⁴⁶ has become visible. From the point of view of human abilities, inserted here in the context of the Theory of Multiple Intelligences⁴⁷, the most related to people⁴⁸ are the ones that are gaining greater evidence today. This condition gains relevance when we observe the role that the bicycle can exert in view of the data presented. Cycling as well as walking⁴⁹ are ways to experience space in a way that our cognitive structure can enjoy. And this has a dimension that varies according to a few conditions and issues that have been worked by experts over the years⁵⁰.

The characteristics of the route are directly related to the quality of the experience that can be achieved, and it is not by chance that the contact with green areas tends to enhance this condition.

⁴⁶ The strengthening of social networks with the Internet, despite one could imagine, reinforces interpersonal contact, outdoors practices and social movements. The very use of the bicycle and the acknowledgment of such practice in urban planning, is an expression of human valuation.

⁴⁷ See Howard Gardner (1993).

⁴⁸ To the physiological aspect and bodily experience, as regards what is at its physical range, and the interpersonal and intrapersonal.

⁴⁹ Running, swimming, surfing, sailing, climbing, among others, also promote this experience in distinct spatial and demographic way.

⁵⁰ But does this have a measure? A maximum surface? A full speed? A maximum time? A spatial quality nature? Certainly, yes to these questions here, as well as to those that have not been made.

The greatest evidence is in the item *time spent in the most frequent path that you perform by bike*, which shows that more than half of the users are restricted to a commuting time of up to 30 minutes. In view of an average commute speed of 10 to 12km per hour, it is reasonable to assume that more than 90% of cyclists are restricted to distances of up to 10km, with the majority restricted to 5km. In Rio de Janeiro, this feature appears to be even more pronounced since 83.6% of cyclists have a commute time of up to 30 minutes.

Another aspect that strengthens the bike as a local-scale urban articulator is related to the item *to which destinations you use the bike as a means of transportation*. The main destinations cited were work, shopping and leisure/social gathering. All these destinations are a territorial expression of bike use. Surprisingly, the bike is unlikely to be underutilized regarding educational uses. But it is not difficult to relate the different territorial aspects assumed by educational equipment when they age groups are taken into consideration.

Kindergartens and elementary schools are educational equipment characterized by the proximity of their users' households. High schools and higher education are equipment highly attractive equipment and disregard logics of contiguity. Quality and specificity of teaching are criteria that prevail and overcome distances considered the most competent in bike use. It is not difficult to find students moving from other neighborhoods, other cities or even other countries to have an education, especially higher education.

Moreover, the younger cyclists account for the smallest portion considering all cyclists interviewed, an evidence for an attentive observer now confirmed by the survey data. In Brazil, only 0.6% of respondents are in the 10-14 year-age group, whereas in Rio this rate rises to 1%. This percentage still is a very small portion compared to the potential of using the bike by this age group in other countries.

According to the cycling Embassy of Denmark, 44% of children aged between 10 and 16 in Denmark go cycling to school.

This aspect of the survey need further investigation to claim this issue does not deserve much attention. Therefore, it still seems plausible to say that the bike has more adherence to everyday, ordinary use and that extraordinary uses have less adherence, exception made to leisure and tourism.

Other factors that call attention in the survey is the profile of the novice, adult and economically active Brazilian cyclist. In Brazil, 61.8% of cyclists started using the bike as a means of transportation less than five years prior to the survey conduction. This indicator drops to 42.5% in Rio de Janeiro, which is only behind Recife with 41.9% of new urban cyclists. These data point to a growth in the use of the bicycle as a means of transportation in Brazil and in Rio de Janeiro.

However, to determine this possible growth it would be necessary to conduct a specific investigation on this topic, such as a periodic follow-up of cyclist counts at specific points in the city preferably performed at different times of the year. In this way, discussion on this topic would have a more solid base.

The survey shows that most Brazilian urban cyclists are, in some ways, beginners or have little experience. Belo Horizonte and São Paulo are at the top of the list of the largest number of new urban cyclists.

This framework attests to the importance of bike use as a means of transportation in Brazil. Gradually, the culture of the bike is growing and contaminating new users in several cities. We are interested here in identifying not only the reasons for this possible growth, but to present some reflections about its future horizons.

When asked about what would make them cycle more, 57.6% of the Carioca cyclists said that more cycling infrastructure was a priority. Although 81.2% of respondents in Rio de Janeiro use the bike five days or more per week, 83.6% of the trips are made within a radius of about

5km⁵¹. The crossing of these data allows us to question where the growth potential of the use of the bicycle as a means of transportation in Rio de Janeiro is. Understanding the profile of those who cycle helps, at the same time, to define the profile of those who do not cycle or cycle less. And more important than the response of those who cycle 5 or more times a week would be to find out (or isolate the answers in a new report of this same survey) the reasons of those who cycle once or twice a week, and, more importantly, but impossible with the data of this survey, would be to understand the reasons of those who do not cycle.

The predominantly young profile of the Brazilian cyclist can change over time. The promotion of a culture that favors the bicycle can last a few years. In Brazil, 77.6% of cyclists are aged between 15 and 44 years, while this index is 68.3% in Rio de Janeiro. The age ranges at the ends of the survey – from 10 to 14 years, from 45 to 54, from 55 to 64 and more than 65 – jointly represent 31.7% of cyclists in Rio de Janeiro. Just as the urban design of sidewalks, squares and public spaces of the city should ideally contemplate accessibility best practices, the elaboration of the cycling system should be inclusive and safe for different types of cyclists, children, young people, adults and the elderly. This can be one of the growth pathways of utilitarian cycling in the country.

The reasons that contribute to the increase of this type of cycling are many and diverse. They have roots in the field of urban design and other less tangible roots in the field of planning, policies and urban legislation; they depend on the increase of cycling infrastructure but go beyond; they mainly depend on the investment in the quality of this infrastructure; they are also related to the performance of infrastructure

⁵¹ This is an approximation made by the authors considering an average commute by bike between 10 and 12 km/h and the percentage of commutes lasting up to 30 minutes in the city of Rio de Janeiro (83.6%).

as a system that organizes itself as a network and enhances the variety of travel paths encouraging the greater adherence of the population.

In Rio de Janeiro, the survey shows that the lack of infrastructure (28.8%), traffic education (26.8%) and traffic safety (25.6%) are the three main issues of the day-to-day challenges faced by cyclists. These are issues related to each other and above all to the quality of cycling infrastructure.

The New York City Transit Department has developed a risk indicator that demonstrates the shifts in cyclist safety over the last decade. The decrease in the risk indicator, from 369 in 2000 to 100 in 2011, represents a decrease of 73% in the average risk of a serious injury of cyclists using the bicycle as a means of urban transport in New York. The risk indicator is calculated by the number of cyclists killed or seriously injured in traffic accidents with motorized vehicles, divided by the bicycle use indicator of the period, multiplied by a hundred.

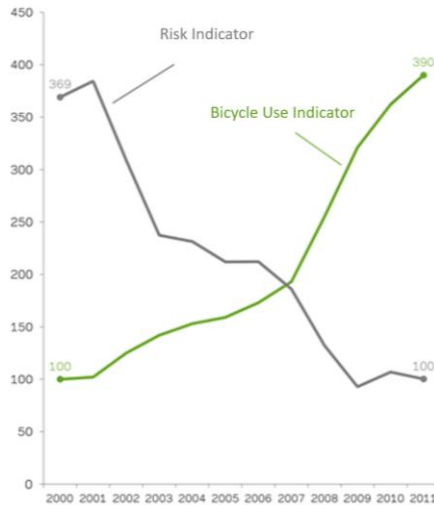


Chart 8.1. Risk Indicator versus Bicycle Use Indicator. Source: DOT (2013). Adapted by the author.

The New York experience highlights what seems a consensus among experts: improvement in cycling infrastructure increases cyclist safety, contributes to an improvement in traffic education by better defining the spaces for each mode of transport and, consequently, increases the number of cyclists. Some of this survey data point in this direction. São Paulo shows the second highest rate of new cyclists in the country, which may result from the fact that between January 2013 and January 2016 a total of 277 kilometers of bike paths were implemented in the city.

At this point, an important reflection is necessary on how to measure the quality of the implemented infrastructure. It is very common for municipal administrations to concentrate their efforts on building kilometers of bike paths as the great measure of a mobility policy that considers the bike as a mode of transport. However, currently there are few means for qualitatively evaluating this infrastructure. What exactly does *more cycling infrastructure* mean in terms of the survey - considering that this is the greatest motivation of the cyclist for cycling more - beyond the kilometers of bike paths, bike lanes and bicycle-sharing paths? This is a reflection that points to the expansion of the set of measures that can contribute to increase utilitarian cycling beyond signaling - vertical and horizontal-, bike racks, changing rooms, and even incentive policies. In this sense, investment in large cycling axes seems less relevant if they are not integrated into a network of bike paths, bike lanes or bicycle-sharing paths.

In January 03, 2012, Law 12,587 was enacted to establish the guidelines of the National Urban Mobility Policy. It defines the National Urban Mobility System as the organized and coordinated set of modes of transport, services and infrastructures that ensures the commutes of people and cargos in the territory of the Municipality. It

is important to think of the bike as an integral part of this System; as a mode among several modes that are connected, are related and complement each other.

In general, intermodality is still low in Brazil. Only 26.4% of respondents use the bicycle in combination with other means of transportation. Rio de Janeiro is above this average, with an index of 34.8%, lagging behind only Niterói and Brasília, with 41% and 52.2%, respectively.

Some factors can explain these indices. The presence of large public transport infrastructures, as the lines of the train - spreading through the Northern and Western Zones-, and the subway lines - Southern Zone, Downtown and Northern Zone- in the case of Rio, in addition to the ferries that connect Downtown Rio to Niterói, all profit from utilitarian cycling. Many workers use the bike as a complementary mode of transport to reach the stations. Some subway stations and urban trains stations have bike parking racks. In the train stations of Santa Cruz, Realengo and Bangu, for example, bike parking rack use is free for those who take the train, have safety all day long, water fountain, mechanical workshop for small repairs and tire calibrator. A registration is required to use the service, which works from 04:00 a.m. to 00h on weekdays and from 04:00 a.m. to 11:00 p.m. on Saturdays. On Sundays and holidays service is not available. In addition, both in the subway and in urban trains the boarding of bikes is allowed from 09:00 p.m. during the week, and on weekends and holidays all day long.

Other cities in the world, with more utilitarian cycling indices than those of the Carioca, work in a similar way, but with lower restrictions. In London, for example, it is possible to transport folding bikes in almost all local public modes of transport without restrictions, and common bikes usually only out of peak hours, i.e. from Monday to Friday between 7:00 a.m. and 10:00 a.m. and between 04:00 p.m. and 07:00 p.m. This time constraint also exists on the Copenhagen subway.

The New York subway system has no such restriction and bicycles are allowed onboard at any time; however, there is time restriction for other means of public transportation and some special buses.

In the ferries that make the connection between Rio de Janeiro and Niterói, it is possible to carry conventional bikes at no extra charge at any time, considering a limit of 10 bikes per trip. Above this quantity, the boarding of non-folding bikes is subject to evaluation.

Another effective way to promote intermodality, which highly contributes to the efficiency and simplification of this dynamics of integration between different modes of transport, is through the bicycle-sharing system. This solution has been shown to be effective for transporting passengers to and from large travel-generating hubs. Rio de Janeiro pioneered the implementation of this system in Brazil. The first model, the *Pedala Rio*, was implemented in 2008 and discontinued in 2011, the same year that the current system – BikeRio – began to operate. According to the Institute for Transportation and Development Policy (ITDP) Report – Bicycle-sharing systems in Belo Horizonte, the Federal District, Rio de Janeiro and São Paulo – that compared the bicycle-sharing systems in these cities, BikeRio⁵² was the system with the largest number of trips per day and, at the same time, showed the best performance indicators. A factor that attests the importance of cycling in the construction of the perception, image and territory of the city.

Final Considerations

In recent years, while mobility has been gaining prominence in discussions and debates about urban development, the bike has

⁵² Data collection from bicycle-sharing systems has been little explored and shows much potential.

emerged as a means of democratization of urban accessibility. The impact of the increased commute speed on the social environment, associated with the territorial impact of transport infrastructures, gradually began a process of reduction, fragmentation and marginalization of the space and of the performance of the pedestrian as a primordial urban agent. Given this situation, statistics and studies have for a long time disregarded commute on foot or by bicycle as an integral part of the mobility system. This has highly contributed to the social emptiness of transport planning that has occurred from the 1970s and has been pointed out by Graham and Marvin (2001). The development in the ways society looks at commuting in the territory has the bicycle as one of its main vectors, since it is considered an inclusive means of transportation because of its low investment and maintenance costs, in addition to its high energy efficiency.

However, the agenda around the promotion of the bike as a mode of transport is complex and deserves the attention of actors and agents with diverse knowledge, interests and experiences. This is clear in the item regarding the *motivation for continuing cycling*, in which the possibilities of response⁵³ vary between speed and convenience (52%), cost (18.1%), health (16.8%), other (10.2%) and environmental concern (2.1%). It is not surprising, therefore, that the extremes of these responses are precisely two poles which represent a lack of harmony in the ways the issue is addressed today in Rio de Janeiro. On the one hand, speed and convenience demonstrate how the population deals with the bicycle, and it is mainly linked to the movement, locomotion and efficiency of this mode of transport. At the opposite end is the environmental issue, not less important of course, but less related to the bicycle from the cyclist's point of view. In Rio de Janeiro, the government bodies in charge of measuring, managing and regulating

⁵³ Responses related to Rio de Janeiro.

the traffic are not in charge of the bicycle yet, remaining under the responsibility of the Secretariat of the Environment

Brazil lives a moment of maturity in utilitarian cycling in which contradictions can still occur; a moment in which it is necessary to reinforce what has already been considered as consensus among the experts, despite seeming strange to common sense. A shift in the status quo in favor of the bike as a means of transportation may be the most powerful tool for establishing a cycling-inclusive society. To promote this shift, we must scientifically explore what we have already explored empirically. Either to validate or refute the knowledge we have.

Given this, we must highlight the great value and the demand of knowledge production about bike use as a means of transportation and as a structuring and defining element not only of the territory but also of society. From this knowledge, which is now in construction, it will be possible to measure bike use, to map its routes, to know its users, its risks and its demands. This is the only way we can establish goals, policies and deadlines in an efficient and feasible way. The better outlined the universe of cyclists, the better will be their contribution to our cities.

It is worth highlighting that the survey brings significant contribution to the understanding of the Brazilian cyclist profile. It also corroborates for a better quantification and qualification of a user who is amid a process of transformation that, as such, tends to be different in the near future. In this sense, it is fundamental to carry out new investigations on a regular basis not only to observe whether the characteristics of the cyclist profile evolve but to document the history of his/her transformation. This is the only way we will be able to make conjectures and assumptions about future scenarios and point out cyclist profile trends and spatial physical developments.

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Chapter 9. Bike mobility in Salvador, Bahia: freedom and liberation

Maria das Graças Borja Gondim dos Santos Pereira

Introduction

Bicycle use has been encouraged owing to its place and significance in the set of ideas of the Brazilian society, so well expressed in the text of journalist Sebastião Nery (2009): freedom and pleasure, above all, and the whole city to unravel,

The Afonso Pena Avenue, filled with trees, looked like a long green race track. My bike was soaring from above, glorious, and the well-ironed suits and dresses were flying in the wind. From house to house, I delivered one by one. I started in the morning to enjoy the sun. I finished early, to enjoy the afternoon. I did not know delivering laundry clothes was so nice. I pedaled, pedaled the whole city. I took a small map, marked the delivery points and raced towards them (emphasis added) (NERY, 2009, p. 97 *apud* PROJETO CIDADE BICICLETA: MOBILIDADE PARA TODOS, 2010).

By the middle of the first decade of 21st century, bicycle traffic was barely visible in formal urban areas of major cities. From that period on, the bicycle started to be spotted as it circulated in the city. This, perhaps, justified by the unthinkable commute by bicycle without the minimum conditions required for an effective circulation: a cycle system implemented for this mode of transport.

At first, bike users were observed getting around in groups, in night tours in the formal city, surprising the population that was also circulating at such hours, in a complete opposition to the current scenario in which many groups do the same. In peripheral neighborhoods and informal areas, the bicycle has always been present, with poor occurrence, associated both with leisure and work, exposing users to risks, the most obvious being traffic accidents resulting from the total lack of safety in commuting.

The crisis of cities, strongly expressed in the mobility crisis, encourages society to reflect on solutions to the conjunctural constraints shown in mobility when much of the population is submitted to exhaustive non-motorized commutes with great physical wear, in addition to motorized trips that consume hours in traffic and compromise the free time of the citizens and contribute to an unhealthy urban environment.

On the other hand, the idealization of the sustainable city, more humanized and fairer, demands a better functional performance of urban systems, investments applied with greater equity, better distribution of public services supply, reduction of socio-spatial asymmetries in Brazilian cities, and reduction of heavily segregated cities.

The organized pro-bike and technical movements of the sector, already aware of the issues involved, strongly advocate another standard for bicycle use with good prospects for urban mobility. Events proliferate and some experiences, already carried out, strengthen the arguments and press for specific cycling infrastructure in cities, especially after the *Programa Bicicleta Brasil* [Brazilian Bike Program] of the Ministry of Cities⁵⁴. Despite the growing demand for bike use that started more than a decade ago, public managers are reluctant to

⁵⁴ Reference technical book for preparation of the Bicycle Mobility Plan in cities, Brasília, DF (BRASIL, 2007).

implement cycling systems, afraid, perhaps, of the assessments of the motorized users of the modes of transport and of entrepreneurs in the collective transport system, where there is strong space-sharing resistance.

Bicycle use stands out among the solutions to the urban mobility crisis. Its presence has gradually occupied a place in the major cities of Brazil that show lack of infrastructure or little infrastructure - inadequate, discontinued-, and has emerged as an essential means of transportation in medium and small-sized cities.

The national survey entitled the Brazilian Cyclist Profile jointly conducted by *Associação Transporte Ativo*, the *Laboratório de Mobilidade Sustentável* (LABMOB) [Sustainable Mobility Laboratory] of the UFRJ Urbanism Post-Graduate Program and the *Observatório das Metrôpoles* [Observatory of Metropolises] in 2015, shows the motivations and the decision-making criteria, advantages and barriers to the intensification of bike use, thus, broadening the knowledge about biker users.

Data related to the survey about the city of Salvador were analyzed in their specificity, but contextualized in a broader panorama, adding other information produced by important national and regional sources⁵⁵. In these data, specifics of the non-motorized modes of transport – bicycle and walking mode – and the cyclist profile complement each other to consolidate arguments for the design of public policies addressed to the new significance of the bicycle as an effective means of transportation.

⁵⁵ SEDU-PR, 2002; *Instituto de Desenvolvimento e Informação em Transporte* (ITRANS) [Institute of Development and Information on Transport], *Projeto Mobilidade e Pobreza* (PMP) [Mobility and Poverty Project], 2003/2004; *Companhia de Desenvolvimento Urbano do Estado da Bahia* (CONDER) [Urban Development Company of the State of Bahia] (2009); O/D Survey, SEINFRA (2012); ANTP General Report (2013; 2015).

Bicycle and modal distribution

Modal distribution data of the urban means of transportation⁵⁶ in the national mobility panorama show that 40% of trips are made on foot or by bicycle, with a percentage of 36% and 4%, respectively, according to the 2013 General Report of *Associação Nacional de Transportes Públicos* (ANTP) [National Association of Public Transport] shown in Chart 9.1⁵⁷.

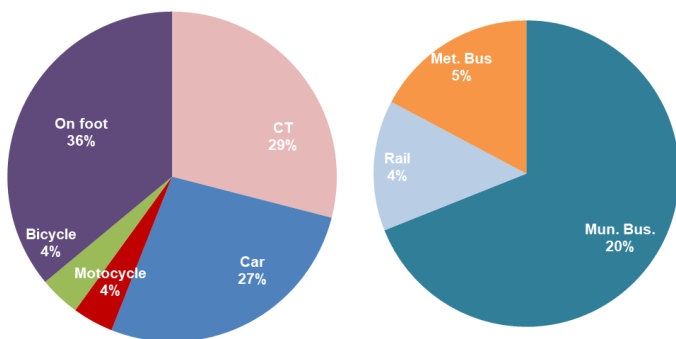


Chart 9.1. Modal Division, total value. Source: 2013 General Report (ANTP, 2015, p. 6).

The same report highlights that trips in the non-motorized mode grow inversely proportional to the size of the cities. In small cities, the

⁵⁶ The modes of urban transport are classified into two categories: Motorized Transport – MT, comprising Public Transport – PT (Municipal bus, Metropolitan Bus, Rail Transport) and Private Transport – Pvt T (Cars and Motorcycles); and Non-Motorized Transport – NMT (walking mode, bicycle mode).

⁵⁷ ANTP, 2013 Report – *Sistema de Informações da Mobilidade Urbana* [Urban Mobility Information System] (ANTP, 2015).

participation of both the walking and the cycling mode is responsible for 52.4% of the trips, while in cities larger than 1 million of inhabitants, as Salvador, the participation of non-motorized modes is about 35.8%, as shown in Chart 9.2. It is worth pointing out that bike trips account for 8% to 10% of the total non-motorized trips.

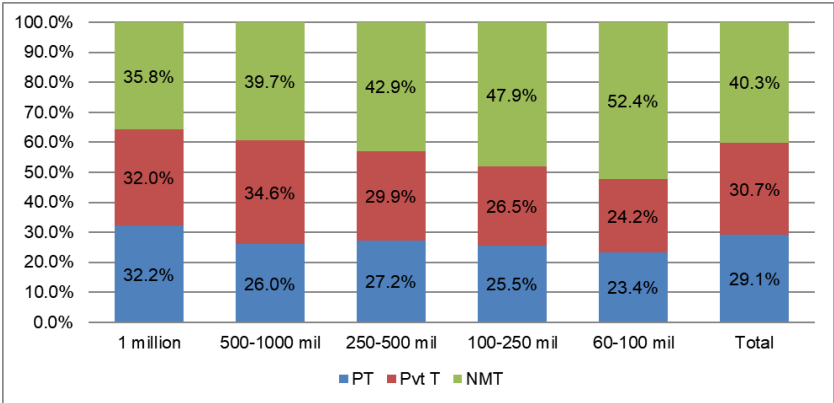


Chart. 9.2. Mode division, according to municipality size. Source: 2013 General Report (ANTP, 2015, p. 7).

The large participation of non-motorized modes in total trips surprises and becomes even more significant when other complementary commutes are analyzed, in addition to the main trip mode, such as access to transport terminals in both home-work directions. This criterion shows the disproportionate participation of non-motorized commutes (62%) in relation to motorized commutes modes, that is, public (19%) and private transport (18%), as shown in Chart 9.3, pointing out the great inefficiency of the motorized transport systems to meet the demand for urban mobility.

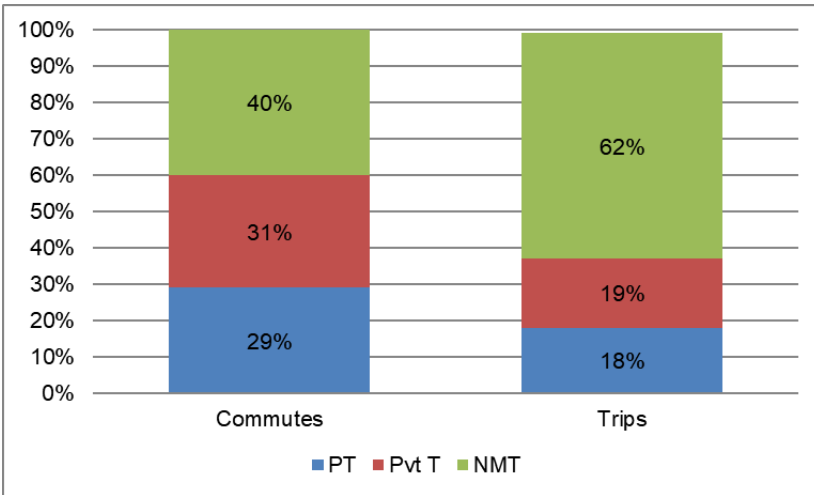


Chart 9.3. Mode Division of total commutes, compared to trips. Source: 2013 General Report (ANTP, 2015, p. 34).

Specifically, in the Metropolitan Region of Salvador – MRS, the modal division records 36.2% of the trips carried out in the non-motorized mode and 63.8% in the motorized modes, covering the private transport and the public transport, in the Origin/Destination survey of the *Secretaria de Infraestrutura* (SEINFRA) [Secretariat of Infrastructure] conducted in 2012 and shown in Chart 9.4.

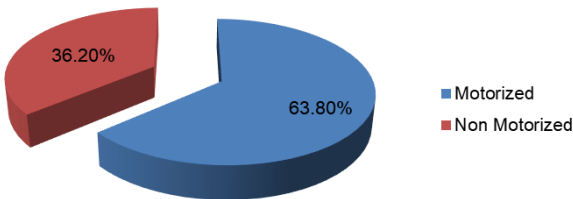


Chart 9.4. Mode Division, trips/day in the Metropolitan Region of Salvador (MRS). Source: O/D Survey, SEINFRA (2012).

In the MRS, with data strongly pulled by the city of Salvador, non-motorized trips correspond to 35.3% in the walking mode, and 0.9% in the cycling mode, which is consistent with the national parameter for cities above 1 million inhabitants, as displayed in Chart 9.2. The other motorized modes appear in the MRS as follows: public transport with 41% and the private and other modes of transport with 22.40%, totaling 63.4% (SEINFRA, 2012). One can intuitively infer a direct correlation between the predominance of trips in the non-motorized modes and the lower economic classes, which was attested by the survey data conducted by SEINFRA in 2012. In the MRS universe, when motorized modes (public and private) and non-motorized modes are correlated to economic classes, this research shows that classes D and E, but also class C, strongly commute using the non-motorized modes, walking and cycling, according to Chart 9.5.

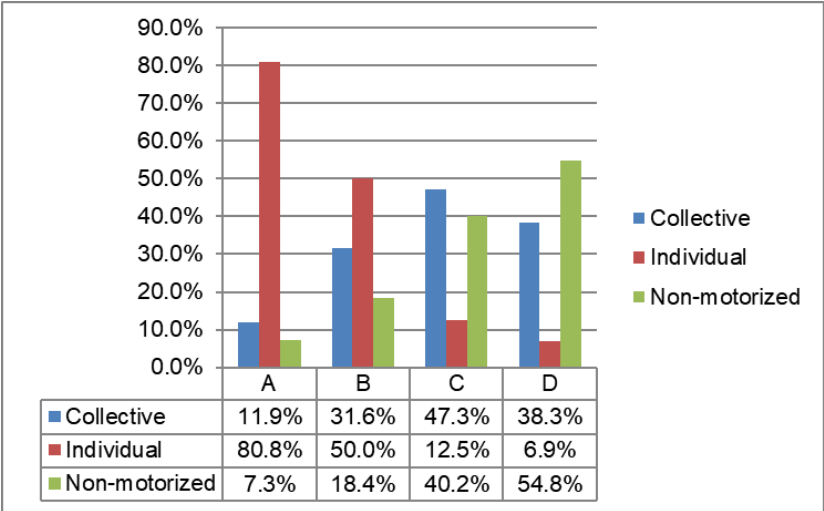


Chart 9.5. Mode distribution according to Economic Class. Source: *Pesquisa Origem/Destino* (Origin/Destination Survey), SEINFRA (2012).

The survey data abundantly demonstrate the detachment between the transport systems and the economic capability of large portion of the population, displaying the structural inefficiency of urban mobility. In this sense, understanding the nuances of the distribution mode is a requirement to face up the challenges presented by the current urban mobility crisis that, according to common sense, is only associated with saturation in road and transport systems. Certainly, the social dimension is the most critical dimension of the mobility crisis, the point of contact of the platforms of the right to the city and to sustainable cities, central to a serious discussion about the cycling mode, niche for large achievements in sustainable urban mobility in which the bike plays a strategic role.

The bike and the social dimension of mobility

Studies on the relationship between mobility and poverty, focus of the survey conducted by ITRANS in 2004⁵⁸ in four metropolitan regions, conclude that about 45% of the Brazilian urban population, with **monthly family income less than three minimum wages**, lives in a situation that prevents them from overcoming poverty, a situation strongly resulting from territorial exclusion (PNAD/IBGE, 2001 *apud* ITRANS, 2004, p. 11). In opposition to this reality, on average, 40% of low-income families have at least one bicycle, while the ownership of motor vehicles is nearly insignificant, suggesting that the lack of infrastructure and the lack of safety are factors that inhibit the use of bicycles in cities (ITRANS, 2004, p. 14).

⁵⁸ ITRANS, Mobility and Poverty Project, 2003/2004.

When this percentage of 45% is applied to the MRS population, results indicate that 1.6 million⁵⁹ of people is in a situation of territorial exclusion and this can be explained by the following reasons: high tariffs of the public transport, high proportion of transport expenses in family spending; poor public transport services with low frequencies and long standby times; lack of safety; and limited destinations of transport lines and articulation with urban terminals. It is worth pointing out that long walks on foot or by bicycle do not represent an alternative for lower income classes, but they are imposed to the people who have found ways to evade paying public transport system fares (ITRANS, 2004, p. 17).

Such a restrictive framework creates perverse effects with regard to commute to work, namely: exacerbation of the high rate of unemployment and inactivity resulting from difficulties in commuting, which reached a situation of unemployment due to discouragement; low effectiveness of the transport voucher for a segment of the population with low employability in the formal market; and, transport, its supply and frequency, listed as one of the main issues in neighborhoods of the metropolitan regions (ITRANS, 2004, p. 14).

Commutes for other purposes, namely leisure, education and access to public services are also limited, if not more restricted, especially on weekends with decreased fleets in circulation. This reduction creates a barrier to networks of relationships, of solidarity, and to rides that are necessary for survival with full access to an extended social life that characterizes the urban way of life.

⁵⁹ See “Salvador: Transformações na ordem urbana”, by Carvalho and Corso (2014).

Updating the numbers with the 2010 IBGE Census⁶⁰ data, according to Table 9.1, 43.3% of the Brazilian population (not exclusively the urban population in metropolises) earns from one to three minimum wages per month. The two lower income ranges – individuals without income (6.6%) and individuals earning up to half a minimum wage (32.6%) – total 39.2% of the population for whom access to transport systems is very limited or extremely difficult as no conditions are offered to their effective use.

Income	Population
Without income**	6.6%
Up to half 1 minimum wage	8.1%
Between half and 1 minimum wage	24.5%
1-2 minimum wages	32.7%
2-3 minimum wages	10.6%
3-5 minimum wages	8.3%
5-10 minimum wages	6.1%
10-20 minimum wages	2.2%
More than 20 minimum wages	0.9%

Table 9.1. Monthly Income of the population (Minimum Wage*). Source: IBGE, 2010 Demographic Census. * Minimum wage used: R\$ 510.00 * * Including people who only receive it in benefits

It is worth noting that, from 2000 to 2010, real income growth reached 35.9%⁶¹ among the 10% of the population that earns the lowest wages. Considering the six-year interval between the two documents - ITRANS Report (2004) and IBGE (2010) –, one can see that the

⁶⁰ IBGE, 2010 Demographic Census. Available at: <<http://economia.uol.com.br/noticias/redacao/2012/12/19/ibge-72-dos-brasileiros-ganhavam-ate-2-salarios-minimos-em-2010.htm>>. Accessed Oct. 19, 2016.

⁶¹ Idem.

percentages were maintained, 45% and 43%, respectively, of family income ranging from 1 to 3 minimum wages. Regrettably, as of 2013, incomes have decreased and the number of people in poverty has risen again⁶², which will probably increase the number of people who do not use the motorized modes of transport.

Since the mid-1990s, there has been an important fall in public transport passengers numbers, and a survey conducted by the Special Secretariat for Urban Development of the Presidency of the Republic (current Ministry of Cities, SEDU-PR, 2002) has detected the low percentage of classes D and E⁶³ users. As shown In Chart 6, the participation of classes D account for only 27% of the total of passengers in the municipal buses, and a massive total of 70% of passengers use the rail system that is more accessible. These proportions tend to remain on the same level, or have been resumed from 2013, when poverty rates have started to increase again.

The process of reading and associating the indicators that reinforce the concept of social dimension as a central issue of urban mobility leads us to a comparison between mobility indices⁶⁴ and their opposite, immobility indices⁶⁵. While data in the ANTP Report (2013) indicate a percentage of 1.74 trips/inhab/day in the average mobility on a national

⁶² *Agência Brasil*, in Nov. 5, 2014. Wellton Máximo Fábio Massalli Edition.

⁶³ Income classes as defined by *Critério Brasil*: a criterion adopted by entities and institutes that conduct market surveys for statistical evaluation of the consumption potential of the population. It basically measures the division of the market in economic classes and not only in social classes, that is, it estimates the purchasing power of urban people and families. It is based on a scoring system that considers ownership of durable goods and level of education of the family head.

⁶⁴ Mobility index: relationship between the number of trips and the number of inhabitants of a specific area.

⁶⁵ Immobility index: relationship between the number of people who do not carry out a trip and the number of inhabitants of a specific area.

scale, regional indicators, which are specific to the MRS and were obtained in the SEINFRA Source/Destination survey (2012), indicate that the general mobility index in MRS is 1.65 trips/inhab/day. Thus, specifically, the mobility index for motorized trips is 1.05, whereas the mobility index for non-motorized trips is 0.60 in the MRS.

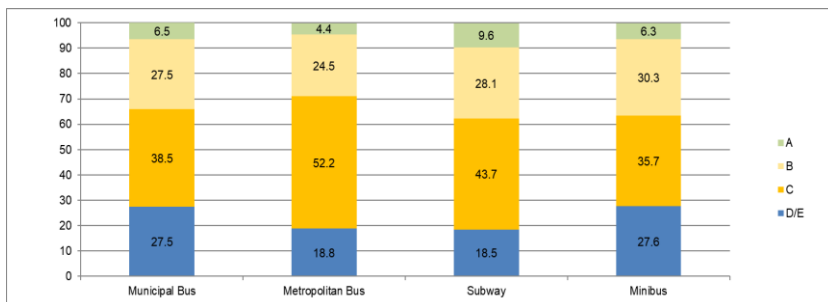


Chart 9.6. National Metropolises: Regular users according to the collective mode of transport and social classes, 2002. Source: SEDU-PR, *Pesquisa de Imagem e Opinião sobre Transporte Coletivo Urbano* Survey on Image and Opinion on Urban Collective Transport Survey (2002).

When correlated with the economic classes, one perceives mobility limitation for classes D and E, and the mobility index of Class A is up to 1.7 times higher, according to Table 9.2, while the MRS general immobility index corresponds to 29.1%, i.e., people who did not travel the day before the survey.

Among other elements that influence mobility and immobility indices, age group, gender and schooling are highlighted. In the MRS, although the female population is larger, men perform more motorized trips and women perform more non-motorized trips. It can be observed that immobility is higher among women (33.3%) than among men (24.1%).

Economic Class	Mobility
A	2.40
B	2.00
C	1.59
D	1.52
E	1.44
General Mobility	1.65

Table 9.2. MRS Mobility Index and Economic Classes. Source: SEINFRA, Origin/Destination Survey (2012).

A possible reading for these data points out that: on the one hand, women are still involved in activities that are strongly linked to homework assignments and children care, consequently, with low or without income, which allows the association, once again, between access to motorized trips and resources availability. On the other hand, men have more profitable and more distant activities from the household, which explains their mobility index. According to Table 9.3, the age range of the higher non-motorized mobility is between 10 and 19 years with an index of 1.18, clearly associated with commutes to school and leisure. Indexes higher than these are in motorized travel between 20 to 59 years, marking greater mobility of the economically active population, with incomes and activities far from home.

Age range	Mobility		Total
	Motorized	Non-Motorized	
up to 9 years	0.44	0.94	1.38
10-19 years	0.76	1.18	1.94
20-29 years	1.42	0.50	1.93
30-39 years	1.40	0.52	1.92
40-49 years	1.32	0.48	1.80
50-59 years	1.20	0.43	1.63
60 years or more	0.85	0.31	1.16
No information provided	1.91	0.75	2.66

Table 9.3. MRS Mobility Index and Age Ranges. Source: SEINFRA, Origin/Destination Survey (2012).

As for schooling, the same tendency of the other indicators can be observed: illiterate individuals have a mobility index of 0.78, while for graduated individuals this index is 2.76, i.e. three and a half times higher (SEINFRA, 2012). Considering that the distance travelled in the non-motorized trips reaches 1.0km/day, while in the motorized trips it reaches distances of up to 11.3 km, with distances varying according to the municipalities' size (ANTP, 2013), the significant difference shows the restrictions imposed to people, characterizing what is called territorial exclusion.

The same survey explains the small participation of classes D and E in three axes: firstly, because it is a social segment that has fewer alternatives for access to motorized transport; secondly, in this group there are the biggest possibilities for collective transport development despite the low payment capacity, since classes B and C yearn for motorized transport; thirdly, improvements in this social group can have a great impact on poverty reduction.

Sposati, however, differentiates poverty from social exclusion, poverty being the inability to retain property while exclusion is related to equality, equity and citizenship. He develops the conceptualization of social exclusion as a “denunciation-concept” (*conceito-denúncia*), relating it to what the author calls four inclusion utopias: autonomy, quality of life, human development and equity.

Taking those four ‘inclusion utopias’ for analysis, given that bicycle mobility is seen as a mode that will help overcoming social exclusion, one can elaborate the following associations with: autonomy, as a fundamental characteristic to be pursued in cycling systems projects, with boarding the bikes into other modes of transport being desirable but optional; quality of life, achieved when the walking and cycling modes guide the city scale components instead of motorized vehicles,

then the urban environment will experience this dimension of the improvement of quality of life; human development, since the access to opportunities and services is made possible by commutes by bicycle and remains solely dependent on the personal commitment to cycling; and equity, directly linked to mobility, reiterates that the condition of

Social equity in the urban area reflects the degree of mobility and accessibility of individuals, a function of the spatial distribution of opportunities, as well as “social inclusion assumes the concept of universalization of citizenship, i.e. exclusion is the denial of citizenship (SPOSATI, 1999, pp. 3-7).

Of the above, highlights are: the different participations of the economic classes in the general framework of urban mobility; the surprising percentage of trips and non-motorized commutes reflected in the low efficiency of the urban transport system resulting from decreased rate of users; and the revealing indices of mobility and immobility that indicate that the social dimension of the mobility crisis reflects economic, systemic issues, and point out the strong interweaving of mobility crisis and cities. In this scenario, with the goal of challenging the existing issues in the urban space, the cycling mode is presented as a means of overcoming the barriers to the reduction of poverty and social exclusion.

Bike, effective and sustainable mode of transport

The segment that moves around the city using the motorized modes, private and/or collective, considers that mobility issues result from saturation of the road and transport systems, priority given to private vehicles in urban planning decisions, supply of transport lines

determined by interests related to bus companies' profitability, and reduction of bus fleets on weekends, for the same reasons.

For the population segment that uses the walking or the cycling modes, however, mobility crisis is reflected both in the impositive walks, in commute by bicycle without sidewalks and without cycling infrastructure and safety, and in the absolute impossibility of consumption of public transport services, with the social consequences already cited.

The vicious circle of transport systems will eventually condition the significant participation of the non-motorized mode in modal distribution. This circle is characterized by events occurring in the following sequence: crisis of cities and mobility, increase in congestion, reduction of attractiveness of collective transport, increase of private transport (including bikes), reduction of collective transport users leading to an unfavorable operating cost and the consequent increase in tariffs removing from circulation the portion of the lower income population, those who do not receive the benefit of the transport voucher, which will generate an increasing trend in the volume of non-motorized mode trips (GOMIDE, 2003, p. 23).

Primarily, the urban mobility strategy aims a better development for the public transport systems through performance improvements with the probable migration of part of the private transport user to public transport. With a view to the incorporation of those contingents that can not afford transportation costs in their budgets, the subsidy option is considered, but the cycling mode is presented as a possibility, a more feasible possibility indeed, at first fragilely supported by the urban and sector planning.

The initiatives that contemplate the implementation of some components of cycling systems are rarely systemic and integral conceptions. As such, predominantly, they do not address the priority

purpose pointed out by bicycle users – work⁶⁶-, they do not ensure a continued cycling circulation in the cities, and they do not preserve the cyclist's commute autonomy.

Important changes in the perception of society on the requirements for a sustainable urban life provide additional advantages to cycling systems, especially when this mode is correlated with the dimensions of sustainability, defined by SACHS (2002), an exercise that will help highlighting the intrinsic contents of bicycle mobility and the relevance of expanding this mode so that it may become an effective transport system. When analyzing the peculiarities of the cycling mode in relation to the sustainability dimensions set up by Sachs (2002, p. 85), the following observations emerge:

When he defines the social dimension as “full employment, decent quality of life, equality in access to resources and social services, reasonable social homogeneity”, it is noted that the urban social reality is strongly characterized by segregation, socio-spatial imbalances and fragmentation of cities, confronting these requirements of social sustainability. Bicycle mobility is an important route for social achievements: it favors the home-work routines, reduces the effort in commuting, enables work initiatives in the informal sector, contributes to the reversal of the sharp territorial exclusion and the high accounting of unemployment by discouragement and facilitates access to social services: education, health, social assistance and others.

When the author sees the cultural dimension as the “balance between respect for tradition and innovation, capacity of autonomy for

⁶⁶ Survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

the elaboration of an integrated and endogenous national project, self-confidence and openness to the world”, bicycle mobility enables to live new experiences in urban space because it favors new perceptions of the city, new topological situations, interactions on another level, with another rhythm, on another scale - the human scale⁶⁷. The bicycle, in the population’s set of ideas, is associated with a sense of freedom and autonomy. In this analysis, if it seems rather excessive to associate it with the scale of transformation of a national project, at least, the fact is that the bicycle will increase the national production, since Brazil is the 4th bicycle producer in the world (ABRACICLO, 2016).

When Sachs relates the ecological dimension to “the preservation of renewable resources, limitation of use of non-renewable resources”, he indirectly establishes an environmental parameter that values bicycle mobility, due to the fact that this vehicle does not intensify fossil fuel consumption, allows most of the population to benefit from road infrastructure and integrates with the urban system, using only with the energy of the individual effort itself.

When he understands the environmental dimension of sustainability as “the respect and emphasis on the capacity of natural systems to clean themselves”, faced with the challenge of present a solution for the absorption, in the transport system, of 40% of non-motorized travel, he signals for the adoption of another technological standard of performance for motorized modes, reducing the consumption of environmental resources, both in vehicle production and in system operation. Comparatively, the bicycle does not participate in the counting of fuel consumption or atmospheric

⁶⁷ Jan Gehl, Danish architect, author of the book entitled *Cities for People*, promotes the recovery of the human-scale design for cities. He proposes the combination of bike paths, public transportation, good sidewalks and exclusive pedestrian pathways as one of the guidelines to start improving the quality of cities.

emissions, while the collective transport (buses), for example, accounts for 22% of local pollutants and 36% of greenhouse pollutants (CO₂) and private vehicles account for 79% and 65%, respectively (ANTP, 2013, p. 49). The convenience of cycling systems is also demonstrated by the fact that bicycle use helps to decrease pollution in urban areas and it does not contribute to an increase in global warming, which is promising.

When Sachs refers to the territorial dimension as “decreased asymmetry in the application of public investments between urban and rural areas and biodiversity conservation”, he highlights the breadth of bicycle mobility programmes, of a wide territorial and social range, not restricted to large cities, nor exclusive to the socioeconomic classes that experience the limited access to the means of transportation. Investments in cycling infrastructure favour the reversal of the imbalance of the amounts applied, concentrated and historically, in the infrastructure addressed to the motorized modes, especially the private ones.

When, on the economic dimension, he “emphasizes the balanced inter-sectoral economic growth, the capacity of continuous modernization of production instruments”, he allows the association of the cycling mode with the potential dynamization of the urban microeconomy and economicity resulting from commuting costs. In addition, compared to the other modes of transport, the cycling system presents the best cost/benefit relationship in infrastructure provision, fuel consumption and even in an optimized relationship between costs and commuting time.

When Sachs considers the political and international dimension as the “capacity of the state to implement the national project in partnership with all entrepreneurs, a North-South development package based on the principle of equality”, he means that internally one should also aim to find a standard of equality, to strengthen the political option for the lower socio-economic classes. As such, the aim

is also to privilege the non-motorized commute mode, not as systemic contingency, but as a cultural change of broad scope, absorption of values in transformation that shall be vigorous enough to trigger the renewal of socio-spatial practices and to design new social, governmental and non-governmental arrangements involving a large population contingent.

In such an exercise, specifically, the intrinsic contents of bicycle mobility and the relationship with the concept of sustainability are highlighted, as well as the major transformations that can take place in the broad use of the cycling mode with the integration of spaces, of people, of services, of destinations, with direct impact on the economy and on the quality of the urban way of experiencing the city.

When analyzing the dimensions of sustainability, one clearly perceive the total adherence of bicycle mobility to the concept of sustainability, which is the reason why bicycles have been recognized by the United Nations (UN) as “the most sustainable means of transportation in the planet”⁶⁸, despite the negligence in implementing infrastructure and in supporting bicycle users.

The bicycle as a sustainable means of transportation, the significant indicators of non-motorized trips - similar in Brazilian cities -, the relationship between this indicator and poverty and social exclusion, added to data from the recent survey on the ‘Brazilian Cyclist Profile’ that shows the use of bicycles for the ultimate purpose of commuting to work, substantiate the option for bicycle mobility and elevate the cycling systems to the condition of an emergency infrastructure to fight against the important condition of the urban social and territorial immobility.

⁶⁸ Cited in *Programa Brasileiro de Mobilidade por Bicicleta – Bicicleta Brasil* [Brazilian Bicycle Mobility Program – Bicycle Brazil].

Bike user in Salvador

The third most populous city in Brazil, with 2.7 million inhabitants (IBGE, 2010), Salvador presents, like most Brazilian cities, barriers to mobility that reflect current and historical urban processes: re-territorial organization with formation of new urban centralities; policies for the use of the soil with no connection with transportation, mainly housing policy; continuous increased fleet of private motorized vehicles that feed the vicious circle of mobility crisis; high degree of segregation of lower-income populations, among others. The specificity of mobility in Salvador results from its location geomorphology and its shape that induced the configuration of the city's structural road system, converging for a specific area of the city, making the operation of transport systems even more complex with bottlenecks of difficult traffic flows, urban circulation nodes, even for bicycles.

An analysis of each of the influential urbanistic aspects in the city's mobility pattern is not the goal of this work, but we can briefly point out the morphology of the relief as a feature that could represent a complicated element for bicycle mobility. As laid out in Figure 9.1, the coastal plains are highlighted, stained in yellow: that of the Baía de Todos os Santos [All Saints Bay] and that of the Atlantic waterfront, heading north along the coastline.

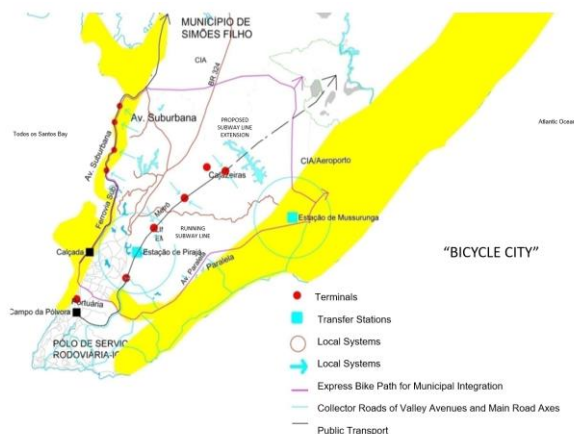


Figure 9.1. Salvador, Bike City - Morphology and urban components. Source: CONDER (2009).

At the tip of the Salvador Peninsula and in the area between the two coastal plains, the relief presents a wavy morphology, which marked the image of Salvador as a city with many slopes. This conformation, however, was managed in such a way that a system of valley avenues and a network of ridge pathways form two planes of circulation in different dimensions connected by the slopes, and this is a schematic description of circulation in the city. At the Core (*Miolo*), the central area between the two main road axes - BR 324 and Paralela Avenue - differences of dimensions between the valley and the ridge are more accentuated, with steeper slopes, requiring special effort and/or interconnected support systems for bike use. The peculiar nature of the city relief, curiously, is not emphasized in the CONDER survey conducted in 2009, mentioned only by 6% of respondents (SANTOS PEREIRA, 2010).

The data emerging from the recent survey performed to characterize the Brazilian Cyclist Profile⁶⁹, in metropolitan regions of Brazil, highlight the workplace as the main destination of bicycle use, corresponding to 88% of the users interviewed, on a national level, and to 84.5%, specifically in the metropolitan region of Salvador – MRS, as indicated in Chart 9.7. Among other destinations, leisure stands out with a percentage very close to that of work.

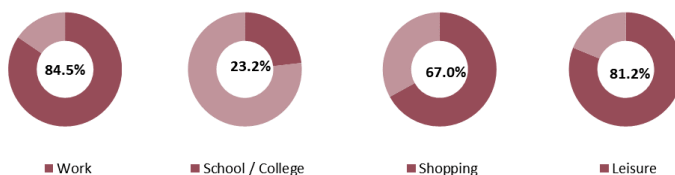


Chart 9.7. Main destinations. Source: Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

The motivation for using the bicycle to commute to the workplace (84.5%) clearly defines the guideline for mobility in urban planning and sectoral plans. It is important that, although there is no cycling infrastructure directed to commutes to work, this percentage already appears larger than commutes to leisure (81.2%), which has the traditional circuits along the waterfront, characteristic of coastal cities, expanded with the streets closures for leisure and definition of routes for cyclists on Sundays in some neighborhoods.

⁶⁹ *Parceria Nacional pela Mobilidade por Bicicleta* [National Partnership for Bicycle Mobility], July 2015.

The reversal of the main motivation for bicycle use reflects the convenience of this mode as an effective means of transportation for the urban mobility system and the enormous lack of cycling infrastructure with a focus on the workplace as destination, aspiration of the population residing in the Brazilian metropolises, as a way of setting the urban population free from exhaustive and unsafe commutes in non-motorized modes, mainly in Salvador.

The autonomy for bicycle commute throughout the city is a conception that shall guide the construction of a cycling network addressed to the demand of commuting to work. Thus, the routes must be strategic, connecting the poles that generate the flows with the nodal points of the road and transport network, which are the requirements for complete system allocation where the recreational circuits, which are secondary, make up route alternatives for the work circuits.

Analyzing the specific data of the city of Salvador as destination, shown in Chart 9.8, it can be observed that the daily frequency (approximately 70%) of those who cycle in this city -- and of these, more than half (52.6%) that incorporated this routine less than five years prior to the survey conduction, mostly for commuting to work-, indicates the intensification of bicycle use as an effective means of transportation. Those cyclists probably had been encouraged by the economic determinant, by the conquest of large media space by the NGOs that act in the promotion of the bicycle and, mainly, by the effect of the ongoing cultural transformation with the incorporation of sustainability values and of the objectives of the right to the city, a more accessible, more human and more democratic city. Progressively, the association of exclusive bicycle use by the lower income classes is deconstructed since no systemic and articulated cycling infrastructure had been carried out in the city until then.

The City Bicycle Program, developed by CONDER (2009)⁷⁰ up to the level of Functional Plan, met resistance within the state government itself, and is available for government managements with more sustainable urban mobility awareness. In the absence of a bicycle mobility planning on a state level, in 2013 the municipal government of Salvador launched the *Salvador Vá de Bike*⁷¹ Program with some actions already carried out: implementation of public bicycle-sharing stations and cycling infrastructure works in the context of urban regeneration interventions. For accomplishing its goals, it incorporated some of the components of the cycling systems: signaling for the sharing of lanes and segments of cycling lanes, discontinuous stretches not all suited to the requirements of bicycle mobility as an effective means of transportation and with focus on the workplace as its main destination. However, these interventions perform the didactic function of experimentation, which can broaden the perception of how the city can have a better infrastructure.

⁷⁰In 2009, the government of the state of Bahia developed the *Programa de Mobilidade Não Motorizada – Cidade Bicicleta* [Non-Motorized Mobility Program – Bicycle City], with the following objectives: to develop and implement non-motorized mobility solutions (bicycle-pedestrian) involving a set of actions and cycling projects to provide urban space democratization, ensuring social and territorial inclusion, economic viability, environmental and cultural sustainability (CITY BIKE PROGRAM, 2009).

⁷¹*Salvador Vá de Bike Program*.
<<http://www.salvadorvaidebike.salvador.ba.gov.br/index.php/8-programa/1-o-programa>>.

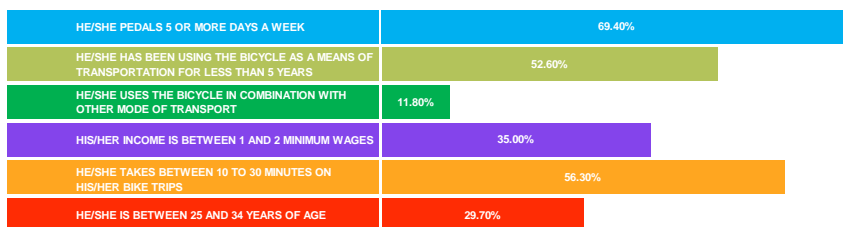


Chart 9.8. Large numbers of bike mobility in the MRS. Source: Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

The data of modal participation and intermodal integration of the bicycle with other modes of transport are still extremely low. Greater range and viability for the intensified use of the bike assume the possibility of boarding it on other means of transportation - bus, subway, train-, to safely shelter them in bike parking racks at the urban transport terminals, to offer paracycles network and to establish standards for providing support to those who travel by bicycle in the high-flow generating buildings: parking lots, public restrooms and changing rooms.

Analyzing the income variable, extending the income range of the users, from users without income to users who earn up to three minimum wages, the percentage of users in the latter range reaches 67.2% in this survey in 2015. Compared to the survey carried out in Salvador in 2009, this percentage reached 96%, with a clear determination of the economic variable for the use of this mode. These data suggest, despite the differences in methodology between the two surveys, that the number of bicycle users with income above 3 minimum wages increased in the interval between the two surveys.

The prevalent time of the routes, between 10 and 30 minutes, indicates distances travelled between 5km and 10km, close to what the literature indicates as more advantageous for bike commutes; however, the percentage is expressive, 29.5%, of those that spend between 30 minutes and 1 hour, travelled by users in an age group that reflects the

greater motivation for commuting to the work, 25 to 34 years, young people that falls into the range of the economically active population. In the survey conducted in 2009, the maximum distances were the routes Itapoã/Simões Filho with 27km and Mussurunga/Engenho Velho de Brotas with 21km. In the same source, it was identified that the male user is predominant, reaching 94%. The numbers are remarkable on the cyclists' income class and gender in Salvador.

The advantages in bike use, detected in the records of motivation for starting using the bike and for continuing using it as a means of transportation, as shown in charts 09 and 10, can be justified: the environmental concern, the expansion of the notion that this modality has an extremely low environmental impact and favors the promotion of social inclusion; costs, which are less than public transport costs - especially for those who do not benefit from transport voucher; speed and convenience, as there is no waiting time between the decision to move and the action of moving, and, for the relative advantage in travel time. Highlight for the health item as another component of the ongoing cultural transformation - healthier practices - which impact on the option of using the cycling mode.

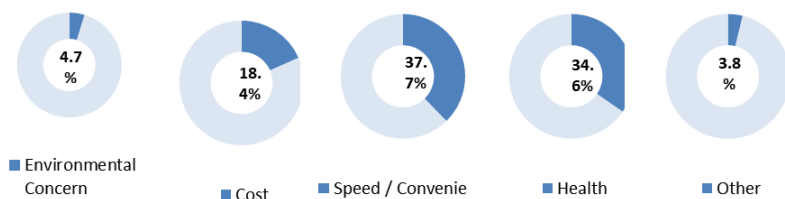


Chart 9.9. Motivation for starting using the bike as an urban mode of transport. Source: Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

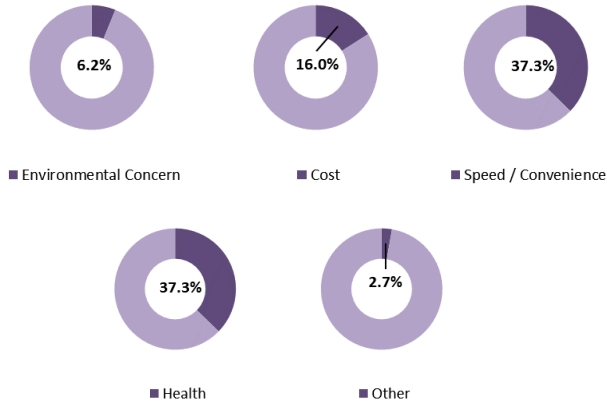
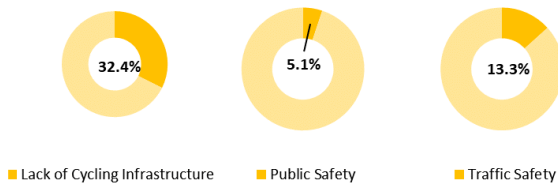


Chart 9.10. Motivation for continuing using the bike as an urban mode of transport.
Source: Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

The survey data that record the issues and difficulties to be overcome are indicative of specific goals for interventions in mobility systems. Charts 11 and 12 highlight the importance given to the lack of adequate cycling infrastructure, with specific landscaping requirements; in addition, issues related to education and traffic safety and public safety are perceived as restrictive factors for bicycle use, thus, they can serve as guidelines to the design of future public policies of sustainable urban mobility.



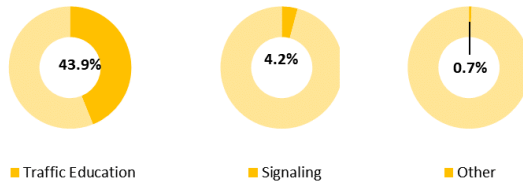


Chart 9.11. Day-to-day issues. Source: Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

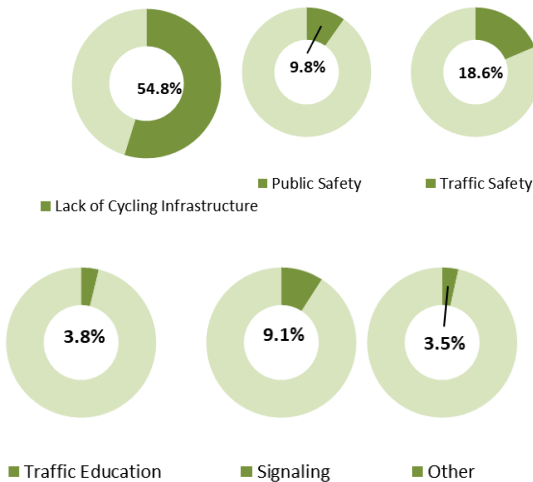


Chart 9.12. Day-to-day issues. Source: Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

The survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015) highlights the infrastructure demands and the threat of dangerous traffic as important issues to face, thus showing the same situation characterized in CONDER (2009) survey, previously mentioned. The fleet of vehicles registered in Salvador comprises 495,991 cars and 8,271 buses and other taxi subsystems, public elevators

and inclined planes, waterways, rail and subway (in implantation) (TRANSALVADOR, 2010). The total number of bicycles is unknown, but 750 cyclists per turn/day were recorded in the CONDER survey (2009) at a specific counting point, Itinga, municipality of Lauro de Freitas, a conurbated area of Salvador.

Despite the recent downgrading of Brazil, now occupying the fourth world bike producer position, the national fleet has more than 70 million of bikes that hide because of lack of infrastructure and safety in the urban environment, against more than 24 million of motorcycles (ABRACICLO, 2016), and 45.4 million of vehicles (cars, light commercial vehicles, trucks and buses) that occupy the entire area of circulation of the cities road network⁷².

Data allow the strengthening of arguments in favor of the bicycle. The cyclist wants to seek opportunities, wants to integrate the economy, to move safely. The bike, besides being a means of transportation to the workplace is, itself, an instrument of work. There are countless bike users who have their microtrade activity where the bike complies with different roles, such as cargo transport, support for fixing various equipment. In addition, its increased use may promote a whole network of business involving the bicycle: small workshops for assembly and maintenance, insurance and others.

Final Considerations

The maintenance of traditional technical options favoring investments in road infrastructure, addressed to the traffic of private and public

⁷² Source: <<http://g1.globo.com/brasil/noticia/2014/03/com-aumento-da-frota-pais-tem-1-automovel-para-cada-4-habitantes.html>>.

transport, as a solution to mobility issues in cities, limits the perspectives of social inclusion and the overcoming of territorial exclusion because, as seen, both motorized systems, private and collective, are inaccessible to a significant portion of the urban population.

In a comprehensive way, the tendency to resignification of non-motorized modes of transport will reverberate across the city as it contributes to the larger and more general purposes of converting cities into friendly, democratic, healthy and sustainable territories, recovering the human scale, favoring full social life for all citizens.

A portion of the population has already been touched by the qualities inherent in bike use. The importance and pertinence of provisions for the construction of a cycling infrastructure have been already acknowledged and the bike emerges in this scenario due to its favorable cost-benefit relation, its sustainable nature, able to help most of the population as it offers the possibility of transforming the daily routines of approximately 45% of the Brazilian urban population⁷³. Bike use will promote a greater integration with the urban dynamics, in autonomous commutes that will travel short and medium distances, releasing an entire social segment that has been subjected to excessive walking travels and has been limited in its access to the city. Technicians and planners add to the organized movements that promote cycling as a mode of transport, but there is no corresponding resonance in the decision-making spheres because they do not only involve technical issues, but policies and interests of the economic sectors.

Participatory planning practices are effective in defending social interests and are means for opposing purposes that do not meet the quality and quantity of services demanded by the population. In this sense, the role of the numerous activist organizations for

⁷³ A total of 45% of the Brazilian urban population has a monthly family income of less than three minimum wages (PNAD/IBGE, 2001 *apud* ITRANS, 2004, p. 11).

encouragement of bicycle use has produced enormous effect on the awareness and education of society about this modality regarding its potential and prospects of improvement with the implementation of cycling systems, as signaled by data of the latest survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015), which provided new inputs to planning.

The Master Plans, the main urban management tool, still do not reflect the recognition of the need for new strategies to promote bike mobility, for example: overcoming the zoning that defines monofunctional areas and increases the number of trips; reorientation of sectoral policies, particularly that of housing when it does not define minimum urban requirements for its implementation, reinforcing social and territorial exclusion; control of expansion of the urban fabric, interspersed by voids, dispersed and devoid of essential services and equipment.

However, it is worth noting that in the update of the Urban Development Master Plan – PDDU, 2015, of the city of Salvador, there is the intention of achieving a comprehensive bike path network, coinciding with the city's structural road system.

The emphasis given to non-motorized modes of transport – bicycle and walking modes – should not influence the correct demand for sustainable urban mobility: the diversity of options, the balanced supply of the various modes of transport. For Jan Gehl,

... a combination of bicycle paths with public transportation, with good sidewalks, exclusive pedestrian routes, have started to make the city more interesting and car dependency has started to decrease ... many people will continue to ride a car for the sake of comfort... then, along with the increase of locomotion options it is necessary to decrease the use of cars, giving less place to them (GEHL, 2012).

Reflections on bicycle mobility, provided by research data analyses, and the resignificance of the bicycle – as an equipment that capitalizes all advantages, all possibilities of renewal of socio-spatial practices, in addition to representing, in the detail of the sustainability narrative, more than a means of strategic transportation for urban solutions–, establish a new set of ideas for the bike: freedom and liberation, a mode of effective transport.

The image of the bike is symbolic of the transformation of the democratic and sustainable city in the contemporary world - an individual object that presents itself as a mobility solution for the overall individuals – which has been gaining icon status, to which the marketing of many products seeks to establish a connection.

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Chapter 10. Modal migration: why we are daily losing cyclists

Daniel Guth

Introduction

In Brazilian cities, the bicycle as a means of transportation has gained more ground and more attention - from the press, governments and the civil society in general. But, in fact, are we pedaling in the right direction and increasing the number of people on bikes and promoting a diverse and inclusive culture of the bike and its uses in the urban setting?

From the analysis of the city of São Paulo, this article is designed as an essay that address some harmful symptoms that enable the identification of a sensitive shift in the cyclist profile across Brazil and in São Paulo. Whether by the growth in the elitization of bicycle use, whether by an increased motorization (mainly motorcycles), bicycle culture is undergoing deep changes in Brazil.

The survey on the Brazilian Cyclist Profile⁷⁴ - the common thread that weaves the overall article argumentation and narrative - presents precious data for understanding this complex and potentially destructive scenario that is ahead. It does not only reveal the profile and characterization of those who use bicycles today, but also indicate possible paths for the expansion of bicycle use in Brazil.

⁷⁴ Transporte Ativo. Survey on the *Perfil do Ciclista Brasileiro* [Brazilian Cyclist Profile] (2015).

In this way, the current text historically contextualizes the bicycle and urban mobility in Brazil from legal milestones, the market and the access to the bicycle. It also addresses the decline in bike production and consumption, the shift in the socioeconomic profile resulting from the supply and demand relationship of the bicycle market, the increased motorization throughout the country and, finally, the concrete example of the city of São Paulo.

The conclusion, despite seeming somehow catastrophist at first sight, was conceived as a warning, a yellow sign for thinking and rethinking the cycling policies underway in the country.

Legal historical context

Brazil and, consequently, the city of São Paulo, lives the paradigm of a new driving force for urban mobility policies in the light of the National Urban Mobility Policy (Law No. 12587/12) and of the new urban dynamics that raise innovations, reinvention and a broader and transversal look at the mobility relations with the city.

Until the publication of the new *Código de Trânsito Brasileiro* (CTB) [Brazilian Traffic Code] (Law 9503/97), urban mobility carried the stigma of obtuse traffic, motorized fluidity and efficiency linked to the means of transportation.

The first Brazilian “Traffic Code” was published in 1910 by President Nilo Palmer. It was a decree for the concession of highways. Later, the national codes of 1941 and 1966 created the rules for movement, sharing and signposting on the public road, with decrees published by *Conselho Nacional de Trânsito* (CONTRAN) [National Traffic Council] that were still being protected by the paradigm of the highways culture and of roads and highways spreading in Brazil. In this context, cities, urban commutes and, of course, people were secondary elements in the eyes of the law.

Until 1997, when the current Brazilian Traffic Code (CTB) was approved, human propulsion vehicles, notably bicycles, were regarded

as animal traction vehicles and had, no legal support or recognition as vehicles with their own characteristics, culture and rules.

Passed in 1997, the new CTB, in its article n. 1, sets out a fundamental change when it points to the basic premise of people protection and legal attention:

§ 1 It is considered traffic the **use of roads by individuals**, vehicles and animals, isolated or in groups, conducted or not, for the purpose of movement, stopping, parking and loading or unloading.

The recognition of the “cycles”, *human propulsion*⁷⁵ *vehicles of at least two wheels*, with due priority in the circulation in public roads⁷⁶ was fundamental to break with the invisibility and marginalization surrounding bike use. Subsequently, the Statute of the City (Law 10257/01), under evaluation for 11 years in the National Congress until it was enacted in 2001, ensured important advances for the growth and planning of cities, considering the instrumentalization of the *Planos Diretores Estratégicos* (PDE's) [Strategic Masters Plans] as urban regulatory milestones for the correlation between urban mobility, housing, zoning and social function of property, aiming at the disruption of the “dynamics of social exclusion and urban chaos” (BONDUKI, 2001).

In 2012, after having been under evaluation for 10 years in the National Congress, the President of the Republic Dilma Rousseff sanctioned the Law 12587/12, creating the *Política Nacional de Mobilidade Urbana* (PNMU) [National Urban Mobility Policy], a regulatory legal framework that requires prioritization in the investments and in the public policies related to the active modes of

⁷⁵ Annex I to the Brazilian Traffic Code (BRASIL, 1997).

⁷⁶ Art. 58 of the Brazilian Traffic Code (BRASIL, 1997).

commuting, besides the creation of an integrated urban mobility plan in municipalities with more than 20,000 inhabitants.

Market and bicycle access in Brazil

The first bicycles were introduced in Brazil as of 1870. At the beginning of the 20th century, in Latin America and Brazil, the bikes were extremely expensive and, therefore, were articles mostly affordable by the elites. By the end of the 1940s, bicycles were not much present in Brazilian cities landscape. The absence of a national bicycle industry did not allow its dissemination and popularization, and only the most favored classes imported bicycle parts and whole bicycles, especially from Europe.

With the post-World War II and the difficulties to import pieces, parts and bicycles from Europe, Brazil launched a plan to create and stimulate the national bicycle industry. As such, in 1945 Caloi inaugurated the first national bicycle factory, located in the city of São Paulo⁷⁷. It was followed by Monark and more than 30 other brands and industries that began to adapt the assembly process of imported parts to start a real Brazilian industry of bicycle production.

The 1950s until the 1964 coup were years of the full development and popularization of the bike in Brazil. In this period, the bikes finally reached the working class through models such as *Barra Circular* [Circular Bar] (Monark) and *Barra Forte* [Strong Bar] (Caloi) - models widely widespread throughout the country to this day. They became popular due to the resistance and robustness of their frames and the support area of the luggage carrier that is better than the one of models found in the market, designed to carry cargo, objects and even a whole family.

⁷⁷ In Brooklyn neighborhood.

With the military coup and reforms in the economy, the more than 30 brands of bicycles in the market and in the national industry gradually ended their productions. Until the 1980s, difficulties in machinery importation and debts linked to the dollar led to the monopoly of two major brands - Caloi and Monark - which, together, concentrated 95% of the internal market for bikes.

With redemocratization, the economic openings - especially in the 1990s - and the introduction of mountain biking in Brazil, the bicycle market reheated, bike shops appeared (stores with bikes, parts and specialized parts), new brands, national and imported, which have conquered new internal markets, until Brazil reaches the mark of 3rd largest bicycle producer in the world and 5th largest consumer (ABRACICLO, 2016).

Both the growth in bicycle production and consumption, and in its use in Brazilian cities, are fully associated with public policies, as we will see below. If, on the one hand, the framework of legal milestones creates the conceptual and legal conditions for public investments in active mobility, on the other hand the public power has not done its part to ensure the provision of necessary public policies that would consolidate bike use with its due priority and legitimacy, following the development of Brazilian cities.

Decline in the production and consumption of bicycles in Brazil

Data from *Relação Anual de Informações Sociais* (RAIS)⁷⁸ [Annual Social Information Report] indicate that the number of bicycle manufacturers, parts and accessories has increased considerably between 2002 and 2011, from 173 to 235 national producers. Data only comprise the formal market. In relation to the regional distribution of these producers, the Southeast concentrates most of them with 63.6%;

⁷⁸ Ministry of Labor and Employment.

followed by the Southern (13.3%), Northeastern (11.6%), Midwest (6.4%) and Northern (5.2%) regions.

The Northern region, although having few companies, is responsible for a fairly significant portion of the national production of bicycles - of 21% - especially as a result from the fiscal benefits and industrial policies implemented by the federal government since the military dictatorship to encourage the *Polo Industrial de Manaus* (PIM) [Industrial Pole of Manaus].

Between 2002 and 2011, in addition to an increase in the number of national producers, there was also an increase in the numbers of workers in the sector, rising from 4,671 to 7,904, which was an increase of almost 70%.

From data from the annuals of *Associação Brasileira dos Fabricantes de Motocicletas, Ciclomotores, Motonetas, Bicicletas e Similares* (Abraciclo) [Brazilian Association of Motorcycle Manufacturers, Motorized Bikes, Scooters, Bicycles and Similar Vehicles], in 2009 Brazil reached the position of 3rd largest bike producer worldwide and 5th largest bike consumer.

Despite this increase observed until the mid-2000s, from the year 2008 both production and bicycle consumption have begun to present a strong fall. Between the years of 2008 and 2012, there was a 21.7% retraction in production, from 5.3 million of bikes produced in 2008 to 4.1 million in 2012. There was also a decrease of 18% in consumption, reducing national consumption by about 1 million of units a year.

The causes of such a decline, both in production and consumption, will be briefly explored in the following chapters. The impact of these numbers can also be correlated with daily bike trips. Therefore, the fall in bike production and consumption has directly impacted on bike use in Brazil, and vice versa.

Consolidated markets vs. potential market (Brazilian)

Europe is a great bike producer and consumer. In 2011, almost 12 million of bikes were manufactured in continental Europe and more

than 20 million of bikes were consumed. Countries such as Germany and Denmark, with almost a bicycle for each inhabitant, still have a very high per capita consumption index.

A per capita consumption ratio of 32 countries⁷⁹ pointed out that Brazil, despite being among the largest bike producers and consumers in the world, is in the 22nd place if we consider consumption per capita. With approximately 70 million of bikes produced to date (ABRACICLO, 2015), including children's bikes, we can say that $\frac{2}{3}$ of the Brazilian population does not even have a bicycle. This therefore means that we have a huge potential market, but what we have observed is precisely a decline in bike production and consumption in the country.

Change in profile and market positioning

Since the 1950s, as previously highlighted, both the bicycle and car market have had positive growth rates. But it was especially from the 1970s that bike production has undergone an intensely acceleration compared to that of automobiles. Between 1970 and 2007, world bike production increased by 261%, while automobile production expanded “only” 124%⁸⁰ (TENDÊNCIAS, 2013).

As of 2008, with the beginning of the retraction in bike production and consumption, motorization⁸¹ rate continued to substantially grow. Especially the motorcycle industry that, with fiscal incentives, credit and financing facilities and almost total production concentration in the PIM, led to a huge expansion of motorcycles acquisition in Brazil at the time. Compared to the automobile, motorcycles and bikes industry, between 1994 and 2013 automobile production grew 162.6%,

⁷⁹ Source: COLIBI - Association of the European Bicycle Industry and COLIPED - Association of the European Two-Wheeler Parts' & Accessories' Industry.

⁸⁰ Source: Earth Policy Institute – Worldwatch, Bike Europe, Ward's.

⁸¹ Motorization rate is the number of motorized vehicles per thousand inhabitants.

motorcycles grew 1093.7%, while bicycle production fell by 30% (ABRACICLO, 2015).

Whether, on the one hand, the market is shrinking in the volume of bike production and consumption, on the other hand the market is offering more employment. This is due to an ongoing change in the consumer profile triggered by changes in the positioning of the market itself, the migration mode of the bike to the motorized means of transportation, and the absence of adequate public policies to ensure safety and comfort to bicycle commuting in Brazilian cities.

The chart below, developed from bike production data (ABRACICLO, 2015), shows the production recoil of bicycles called *basic*⁸² since 2006.

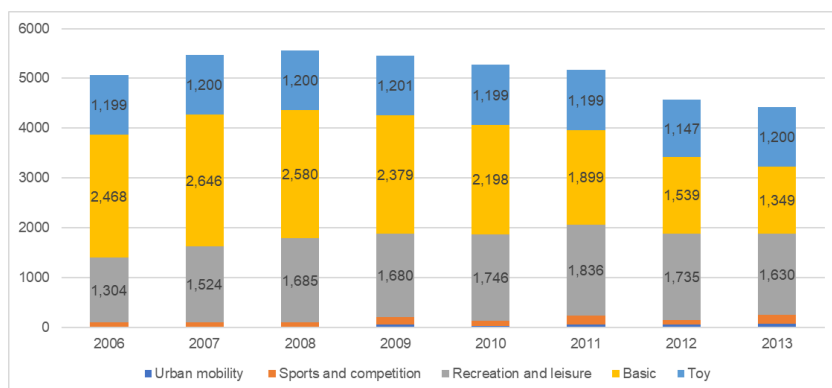


Chart 10.1. Evolution of the national bicycle sale according to type. Source: Abraciclo.

If in 2006, the so-called “basic” bikes accounted for 65% of the national market, in 2013 this number had already fell by 43.5%. And this decline did not result from the growth of other models and bicycle

⁸² The basic bikes are those traditionally marketed for urban and rural use across the country. They are popular bikes, cheaper, especially aimed at workers and hard-working people – strong bar, circular bar and cargo are some of the examples of these bike models.

uses, but rather by the very marked decline of this model. At the same time, other models and uses remained either stagnated or increased slightly, as is the case of bikes for sports training and new urban bikes with greater added value.

Thus, since 2008 the decline in the production of 'basic' bicycles has been noted, while the most value-added bikes, with the greatest embedded technology, have concentrated the attentions of the market and a growing clientele in large cities - which explains the increased sector employability, even with the fall in the total volume of bikes produced in Brazil.

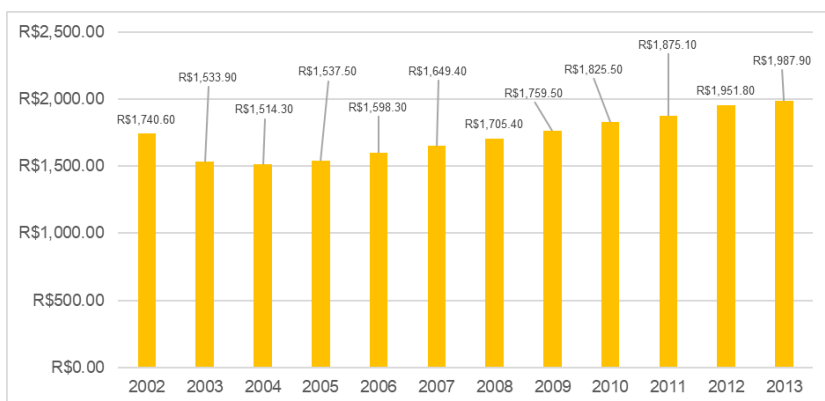


Chart 10.2. Usual average income (R\$ at today's price). Source: IBGE /RA.

The drive towards market elitization and bike consumption results not only from an improvement in Brazilians' income, which led a portion of 'basic' bike users to shift to motorized vehicles and to migrate to other means of transportation, but also from the scarcity in the supply of affordable, inexpensive and functional bikes, together with the strong trend of bicycle adoption as a means of transportation by middle class sectors, mainly in major cities.

Motorization in Brazil

In Brazil, the growth and popularization of bike use were also accompanied by a slight growth of motor vehicle fleet, especially cars (sidewalk). Until 2000, when the production and consumption of bicycles reached its apex, the growth of the motorized fleet also grew, albeit more timidly than from 2001.

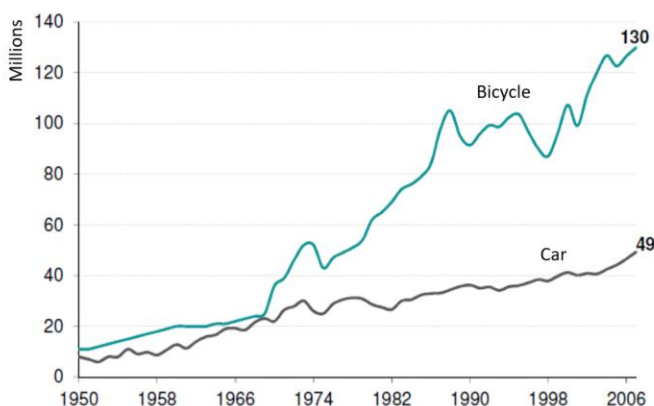


Chart 10.3. Growth of the motorized fleet and the bicycle.

From 1995 to 2000, the increase in the motorization rate in Brazil was 5%⁸³, reaching 199 motor vehicles per thousand inhabitants in 2000. Between 1995 and 2000, the growth of motorcycles was 11%, against 4% of passenger cars. In 1999, the circulating fleet of motor vehicles was 111 per thousand inhabitants, according to a survey of the *Associação Nacional de Fabricantes de Veículos Automotores* (ANFAVEA, 2001) [National Association of Motor Vehicle Manufacturers]. When we compared Brazil to other countries regarding this matter, mainly the US and European countries, its situation differed considerably. Since that time, the production and

⁸³ GEIPOT Statistical Yearbook (2001).

consumption of motor vehicles in Brazil has frantically grown, resulting from factors such as growth of the average income of Brazilians, incentives and tax exemptions for automobile industry, credit facilities and installments, in addition to investments in industrial parks.

From 2001 to 2014, the Brazilian average annual growth of the motorization rate was 6.7% (OBSERVATÓRIO DAS METRÓPOLES, 2015). In 2014, it reached 56.9 million of motorized vehicles. It is worth noticing that motorization rate was 111/thousand inhabitants in 2000 but in 2014 this index already surpassed 280/thousand inhabitants.

From 2001 to 2006, the motorcycle fleet in the country increased by 88% (ABRACICLO, 2015). By the year 2000, Brazil had 3.3 million motorcycles. In ten years (until 2009), this number had already surpassed 12.4 million of registered motorcycles.

Another important factor for the motorization growth in Brazil is the phenomenon of a demand triggered by an abundant infrastructure supply. The construction of highways, roads, avenues, tunnels, viaducts, bridges, in addition to public and private spaces for parking had - and still have - a great influence on Brazilians as these improvements motivated them to buy their own cars and/or motorcycles, feeling themselves increasingly welcomed and comfortable to conduct some of their daily commutes in a motorized mode. Considering just the city of São Paulo, data show that 25% of the entire built area is of garages and parking lots (ESCOLA POLITÉCNICA, USP, 2012).

Based on data collected in more than 400 Brazilian municipalities in 2012, the *Associação Nacional dos Transportes Públicos* (ANTP) [National Association of Public Transport] concluded that 85% of the overall public resources for urban and rural mobility were still being applied in motorized individual transport, investments in infrastructure, maintenance and costing of traffic operations.

That is, increased income, purchase, credit and financing facilities, benefits and incentives to the national industry of cars and motorcycles, in addition to the road infrastructure implemented to stimulate,

support and meet the needs of an increased frequency in motor vehicles use, were responsible for the increasing motorization rate in the country and, at the same time, for the shrinkage in bike purchase and use – bike migration to motorized means – mainly by the low-income population.

The Brazilian Cyclist Profile

To a further discussion of the phenomenon of modal migration and the trend changes in bicycle use in Brazilian cities, two important surveys will be briefly analyzed aiming to unveil the socioeconomic profile of the population that cycles in Brazil.

One is the *Pesquisa de Orçamento Familiar* (POF) [Family Budget Survey], held by the *Instituto Brasileiro de Geografia e Estatística* (IBGE) [Brazilian Institute of Geography and Statistics] in 2008 and 2009; and the other is the survey on the Brazilian Cyclist Profile, carried out by several organizations in 2015 and coordinated by the NGO *Transporte Ativo* (2015) (Rio de Janeiro)⁸⁴.

Family Budget Survey (POF) - IBGE

The objective of the first research, Family Budget Survey, is to provide information on the composition of household budgets, based on investigations of Brazilian consumption habits, spending allocation, and income distribution, according to households and people characteristics. In this way, from the information in the POF/IBGE microdata, it is possible to observe the socioeconomic characteristics of bicycle consumption in Brazilian families.

⁸⁴ In partnership with *Laboratório de Mobilidade Sustentável* (PROURB/UFRJ) [Sustainable Mobility Laboratory] and with *Observatório das Metrópoles* [Observatory of Metropolises].

Of the overall families interviewed, 9.8% purchased at least one bicycle in the survey period, which accounts for 5,650,000 of families. From bicycle consumption according to region, it can be noted that the Northern and Northeastern regions showed the largest concentrations, while consumption was below the Brazilian average in the other regions. Of the more than 5 million of Brazilian households that purchased a bicycle, 38% are concentrated in the Southeastern region, totaling more than 2 million of households. Almost 30% of the consumer households are from the Northeastern region, totaling 1,680,000 bicycles.

According to the survey, the two highest income segments have less representation in bike sales. Households with monthly income from R\$1,200 to R\$3,000 and from R\$600 to R\$1,200 account for most of the households that purchased bicycles, respectively 40% (2.25 millions of households) and 26.8% (1.51 million households). Household income of up to R\$600 accounted for 12% of all households that purchased bicycles.

The monthly average household income for the POF sample, considering only the households that purchased bicycles in the survey period, is 11.8% lower than the average income of the overall Brazilian households. Considering the year in which the survey was conducted, 2015, one can note that the percentage of bike consumption was higher in households with income lower than the Brazilian average.

Survey on the Brazilian Cyclist Profile - *Transporte Ativo*

According to the survey on the Brazilian cyclist profile, held with 5012 cyclists, in ten cities of different Brazilian regions, between July and August 2015, 50.2% of all cyclists interviewed have income of up to 2 minimum wages and 22.8% have finished elementary school. These data corroborate the historical finding of bike use in Brazil, but they cannot be analyzed in isolation, because 38.9% of the cyclists interviewed earn from 2 minimum wages and 7.4% have income

between 5 and 10 minimum wages, a number higher than that of people without income (7.3%).

When we compared the Family Budget Survey (POF) data to the survey data about the Brazilian Cyclist Profile, we found that the bike is mostly used by low-income people. However, in the six years between the two surveys, it is possible to perceive a tendency to a change in the cyclist profile, especially when analyzing the data of the city of São Paulo, which has been receiving important public investments aimed at bicycle mobility.

Although the two surveys are based on different income origins, the Family Budget Survey (POF) on the household income and the cyclist profile on individual income, it is possible to recognize the obvious improvement in bike users' income in Brazil, which is above the growth of the average income for the same period.

Among the survey sampling, applied during weekdays in business hours, 88.1% of respondents said they use the bike to go to work. When the question was about how long they have been using the bike as a means of transportation, 37.3% responded "for more than 5 years", while 14.5% responded "less than 6 months".

One of the most curious datum, which is possibly a strong trend indicator on the changes in the cyclist profile and bicycle use in Brazilian cities, is the motivation for starting cycling and the reasons for continuing using the bike as main means of urban transportation. Of the more than 5000 respondents, 42.9% responded that they started using bicycles because they were the fastest and the most convenient mode of transport, 24.2% claimed they were healthier and 19.6% claimed they were more economical. Regarding the reasons for continuing cycling, a total of 44.6% claimed they used the bike because it was fast and convenient, 25.9% because it was healthier and 17.7% because it was more economical.

That is, in both scenarios the speed and convenience represented the central reason for the use of bicycles. However, it is worth highlighting that health was the second most cited reason for cycling; a motivation

that even surpassed its resulting economic benefits (individual and family), which could lead people to adopt the bike as their vehicle.

Although it still represents a high percentage (almost 20%), the economy associated with bike use seems to have less influence on the lives of Brazilians, and this has generated increasingly marked migratory flows towards the motorized means of transportation.

The impacts caused by the situation presented above can locally be observed in changes in the cyclist profile, mainly associated with public policies that privilege regions, social groups and uses and cultures that differ from what has been historically observed in Brazilian cities from the 1970s.

The case of the city of São Paulo

The survey on the cyclist profile of the city of São Paulo⁸⁵ – one city among ten cities in the national survey on the Brazilian cyclist profile - interviewed a sample of 1804 cyclists, comprising 86% men and 14% women. If, nationally, more than 50% of respondents have income of up to 2 minimum wages, in São Paulo this number does not exceed 38%. Of all the people who responded they earned more than 10 minimum wages (7% of the total), 69% are cyclists from the central region of São Paulo, while only 5% are from the peripheral region. In the central region, cyclists earning between 5 and 10 minimum wages account for the largest amount: 22%. In the central region, those who earn up to 1 minimum wage account for 3% of the overall cyclists.

When asked how long they had used the bike as a means of transportation, only 29% responded that they had pedaled for more than 5 years, while 71% responded that they had pedaled for less than 5 years in the city. The percentage of those who responded they “have been using the bike for less than a year” was 37%, surpassing 8% who

⁸⁵ Coordinated in São Paulo by *Ciclocidade - Associação dos Ciclistas Urbanos de São Paulo* [Urban Cyclists Association of São Paulo].

had pedaled for more than five years, which pointed to a renewal scenario and recent encouragement of bicycle use, especially in the central region surveyed. While in the peripheral region 14% responded that they were pedaling “for less than 6 months”, in the central region this index was 25%.

The higher percentage of cyclists who had pedaled for “less than a year” than “for more than five years”, in addition to the fact that more than half of the cyclists had an individual income from 2 minimum wages, indicates that the average profile of those who use bicycles in the city of São Paulo is predominantly middle-class and is, surprisingly, part of the economic elite of the city⁸⁶ - family income higher than R\$ 4,591.

In São Paulo, the percentage of the main motivation to start using the bike as a means of transportation showed the following numbers: 48% responded they used the bike because it was faster and more convenient, while 23% responded it was “healthier” and 18% responded it was “more economical”.

Considering the distribution of the city regions applied in the methodology of the survey, only in the peripheral region “economy” (25%) surpassed “health” (24%) as the main reason to start pedaling. When we compare the reasons given by the cyclists according to regions, “economy” had twice as many responses in the peripheral region compared to the central region.

Another motivator that achieves much more expression in the central region and includes, among other reasons, the implementation of cycling infrastructure, is the ‘other’. In the central region, its percentage is 23%, against only 5% and 3% in the intermediate and peripheral regions, thus suggesting a relationship between an infrastructure addressed to cyclists and a motivation to start using the

⁸⁶ According to the study “The New Middle Class”, of the *Centro de Políticas Sociais da Fundação Getúlio Vargas* (CPS/IBRE/FGV) [Center for Social Policies of Getúlio Vargas Foundation. See Neri (2008).

bicycle. Conversely, when we only take into consideration the peripheral region, at least for the profile survey, cycling infrastructure was not appointed as a relevant motivation to start using a bicycle.

It is also important to highlight not only the data on the main issues faced by cyclists in traffic, but also the reasons that would make them pedal even more in the city. On the former question, 56% of respondents claimed that the lack of respect from motorized drivers and the lack of traffic safety were the main issues they faced daily. Only 24% highlighted the lack of an adequate infrastructure, such as bike paths, bike lanes and bike parking racks, as the main issue.

For women cyclists, 63% claimed that the main issues were lack of respect from motorized drivers and lack of traffic safety, while these were the main issues for 54% of men.

On the reasons that would encourage more frequency in bike use, 49% of respondents indicated “more cycling infrastructure” as the main issue, followed by “more traffic safety” (18%) and “more safety against robberies” (14%). It is worth pointing out, however, that in the peripheral region the second most important item that would make people pedal more is “more safety against robberies” with 27% of the responses; while in the central and intermediate regions, this was the concern of only 3% and 10% of the cyclists, respectively.

The interviewees also responded on the frequency of use of three types of road structures: street (sharing with motor vehicles), bike path or bike lane and sidewalks (sharing with pedestrians).

More than 70% of respondents claimed to cycle always or almost always on the street. This shows that sharing with motor vehicles is part of the cyclists’ routine. This is an indicator of the urgent need to promote and encourage a peaceful conviviality between the modes of transport for most people who use bicycles to get around.

The cyclists who evaluated the bike route as ‘very good’ were those who mostly circulated in the central region. Positive evaluations of ‘very good’ and ‘good’ make a downward curve as we move away from the center, ranging from 33% in the central region to 22% in the

intermediate and to 18% in the peripheral regions. Conversely, negative evaluations of 'bad' or 'very bad' range from 23% in the central region to 33% in the intermediate and to 44% in the peripheral region.

When evaluating each region of the city, we see that the incidence of cyclists who 'always' or 'almost always' cycle using a cycling infrastructure decreases, especially in the case of those who 'always' cycle, which falls from 60% of cyclists circulating in the central region at the time of the interview to 52% of cyclists in the intermediate region and only to 34% in the peripheral region.

With this, the frequency of those who 'rarely' or 'never' cycle in bike paths or bike lanes increases as one moves away from the center, rising from only 8% in the central region to 22% in the intermediate region and 33% in the peripheral region. If we isolate only the answers of those who claim they 'never' cycle in bike paths or bike lanes (5% of the total), we see that 81% of these cyclists circulated in peripheral regions at the time of the interview.

Therefore, it is possible to assess that, in the central region, public policies for the expansion of the cycling network have shown positive results for the increase in bike use and also for the contingency of modal migration.

However, for the peripheral region, not only the cycling network is still being implemented and, as such, has not presented results yet, but also it has been assumed that the challenges for the promotion of bike use in this region are distinct from those in the central region.

To begin with, our reflection will focus on the differences shown in the diagnosis presented. As it can be seen, evaluations of routes, roads and cycling structures enormously diverge according to regions. On the issues faced by the cyclists, in addition to structures considered poor, there is still an urgent lack of respect from motorized drivers, violence in traffic, and urban violence (associated with the lack of public safety) - items that are key indicators that will help the planning and promotion of bike use beyond the implementation of cycling infrastructure.

Preliminary data from the survey entitled “Correlates: travel patterns and time trends of bicycling in São Paulo, Brazil, 1997-2012” (USP, 2015) on commutes by bicycle in the Metropolitan Region of São Paulo (MRSP) from the survey *Pesquisa Origem e Destino da Região Metropolitana de São Paulo de 1997 a 2007* [Survey on the Origin and Destination of the Metropolitan Region of São Paulo from 1997 to 2007]⁸⁷ and the *Pesquisa de Mobilidade de Urbana 2012*⁸⁸ [2012 Urban Mobility Survey] show that there was a fall in the use of bicycles in the period from 2007 to 2012.

The number of cyclists decreased from 6.3 to 5.4 per 1,000 inhabitants, revealing a decline that reverses the scenario of the increase verified in 1997 when there were 3.9 cyclists per 1,000 inhabitants.

This downward trend is influenced by the reduction in the number of cyclists among the poorest population that decreased from 9 to 6 for every 1,000 inhabitants between 2007 and 2012. Among the richest, the inverse occurred: the number increased from 2.5 to 4.5 for every 1,000 inhabitants.

The cyclist counts carried out by *Associação dos Ciclistas Urbanos de São Paulo - Ciclocidade*⁸⁹ [Urban Cyclists Association of São Paulo – Ciclocidade] (2015b), in eleven distinct points throughout the city, collaborate to the same conclusion: increase in the cyclists’ flow in the monitored roads that are within the central region and stagnation or retraction of the cyclists’ flow at the counting points in the furthest regions from Ground Zero.

While Brigadeiro Faria Lima Avenue, located in the Western Zone and in one of the richest regions of the city, features solid numbers of bike trip growth, in the Northern region, 20 kilometers from there, the

⁸⁷ Survey held every ten years by the São Paulo Subway.

⁸⁸ Update of the Origin and Destination survey data (Subway).

⁸⁹ The methodology employed was developed by the NGO *Transporte Ativo* (Rio de Janeiro). Counts were held at the same point and accounted for 15 hours over a day (from 6am to 8pm).

cyclist counts did not show an increase in the number of bike trips if we analyze the historical series as of 2013.

Location	2013	2014	2015	2016
Brigadeiro Faria Lima Avenue – Western Zone	1726 trips/day	Counts not conducted	1941 trips/day	2322 trips/day ⁹⁰
Inajar de Souza Avenue – Northern Zone	1413 trips/day	1410 trips/day	1350 trips/day	Counts not conducted

Table 10.1. Bike trip growth: Brigadeiro Faria Lima Avenue and Inajar de Souza Avenue.

Some public policies also contributed to this scenario: still prior to the implementation of hundreds of kilometers of bike path and permanent lanes, we can cite, as an example, the network of leisure bike lanes - structures installed every Sunday and established in the city since 2009 - which make more than 100,000 people leave their homes to pedal around the city every Sunday. These structures, which already add up to 120 kilometers, are concentrated in the most central regions and, when they advance to the farthest regions of the center, they present low numbers of use.

Other measures such as promotion of respect campaigns and creation of the maximum pedestrian protection zone in the central region, reduction of the maximum speeds in the main arterial roads of the city, the advent of collectives, bike cafes, shops specialized in urban

⁹⁰ Since the beginning of 2016, the bike path on Faria Lima Avenue has have an electronic bicycle counter (totem type). This number of trips was observed from a consultation carried out on the *Companhia de Engenharia de Tráfego* (CET) [Traffic Engineering Company] website, where the totem data are made available in real time. The consultation was held on July 15, 2016 (Friday).

cycling, and the very movement of civil society for the promotion of bicycle use, greatly contributed to the growth of bicycle trips in the region comprised in the expanded center.

Impact of cycling infrastructure

One of the main characteristics of the use of bicycles is that they make up a network economy. These economies are highlighted by the increase in the consumption of the same good or service, as the number of consumers of this same good/service increases (KATZ; SHAPIRO, 1985). In this way, a bicycle has its potential increased as more and more people use it as a means of transportation. It is worth highlighting that the notorious and worldwide known study of Jacobsen, published in 2003, "Safety in numbers: more walkers and bicyclists, safer walking and bicycling", relates the safety of cyclists in traffic⁹¹ to the number of trips made on bicycles. This survey used data from cities in California (USA), Denmark, the United Kingdom and the Netherlands. The referred study concluded that the higher the number of cyclists, the smaller the proportion of collisions and hit-and-runs involving cyclists, contradicting the common sense that more people on bicycles would represent an increased risk to this population.

Given this, it is important to point out that despite its encouraging nature, Jacobsen's finding demands the provision of measures (public and private) for its full achievement. On the other hand, there is a huge list of public measures and policies that need to be implemented - here we should not try to list them as the its total is enormously large.

However, it is known that to ensure comfort and safety in commuting, the creation of a dedicated infrastructure, such as bike paths and bike lanes, for example, is one of these measures that we can cite and that in all the literature on the topic is presented as a measure

⁹¹ Number of hit-and-runs and collisions.

of strong impact. Bike parking racks and spaces for bicycle parking are also important measures to promote this network economy.

According to the survey on the Brazilian cyclist profile, 26.6% of all interviewees responded that the lack of adequate infrastructure (such as bike paths, bike lanes, bike parking racks, etc.) is the main issue faced in their daily trips. And 34.6% responded that the main issue faced is the “lack of respect by motorized drivers”. When asked what would make them pedal more, 50% responded it was “more cycling infrastructure”, while 21.5% responded “more traffic safety”.

Cycling infrastructures represent low investments for the public power, but the return on these investments is huge, especially in the medium and long term. It was aiming to increase the use of bicycles in the city that the mayor of São Paulo, Fernando Haddad (PT-SP), then candidate for the election in 2012, signed a letter of commitments⁹² to cyclists in São Paulo, in which he committed, among other things, to increase the offer of cycling structure in the city. His promise at the time was to add 400 kilometers of bike paths and bike lanes to the existing 63 kilometers of bike paths.

The implementation of these 400 kilometers of bike paths and bike lanes, from 2014, with an approximate cost of R \$37.5 million per year, accounted for a total of 0.07% of the annual budget of the city of São Paulo⁹³. Until July 2016, with 3 years and a half of the mayor's management, the city had already delivered 357.8 kilometers of bike paths and bike lanes, totaling a network of 425.8 kilometers altogether.

Despite the fast and necessary expansion of the cycling network of the city of São Paulo, the regional distribution of these implementations occurred in a very unequal way (as we can see in the table below).

⁹² “Letter of commitment to bicycle mobility” campaign. Available at: <<http://www.ciclocidade.org.br/noticias/242-entidades-apresentam-carta-de-compromisso-com-a-mobilidade-por-bicicletas-aos-candidatos-a-prefeito>>. Accessed Oct. 19, 2016.

⁹³ The author's elaboration from the CET-SP data and from the budgetary execution of the São Paulo City Hall data in 2013, 2014 and 2015.

Region	Total of kilometers	Percentage of the implemented cycling network – since 2014
Eastern Zone	82.4 kilometers	23%
Southern Zone	46.6 kilometers	13%
Northern Zone	44.8 kilometers	12.5%
Central and Western Zones	184 kilometers	51.4%

Table 10.2. Percentage of the implemented cycling network in São Paulo per zone.

The concentration of more than 50% of bike paths and bike lanes implemented in the Central and Western regions points to a tendency to privilege audiences and uses that corroborate the tendency to increase the use of bicycles by higher-income people, as well as they corroborate the loss and migration of lower-income cyclists to the individual motorized and collective modes of transport. The quality and fragmentation of the cycling network outside the expanded center can also be considered a relevant factor for analysis on the initial low impact of these infrastructures for the promotion of bike use. While in the Central and Western regions, the cycling network is more like a network - integrating centralities and points of interest and promoting important territorial interconnections - in the other regions, infrastructures are still disconnected and discontinued, with no neighborhoods connections, and still do not fully connect with the cycling network of the central region (main region in daily trips with the purpose of work, studies or leisure).

For exemplification and elucidation, it is worth pointing out that until July 2016 the city of São Paulo had not yet implemented any connection between the Eastern Zone of the city - where 4 million inhabitants dwell – and the Central Zone.

It is undeniable that the implementation of cycling infrastructure has not only a positive impact on those who already commute by bicycle daily, but also on those who have not used this mode of transport yet. The survey data from the Profile of Those Who Use Bicycles in the City

of São Paulo, as presented here, are an example of this, when 37% of all the people interviewed responded they started cycling a year prior to the survey.

But we can go further, by comparing the places where the cyclist counts⁹⁴ were carried out before and after the implementation of cycling infrastructure, on the basis of two important bike paths built in the last 2 years: the Elisha de Almeida Avenue bike path in the Western Zone, and the Paulista Avenue bike path in the Central Zone.

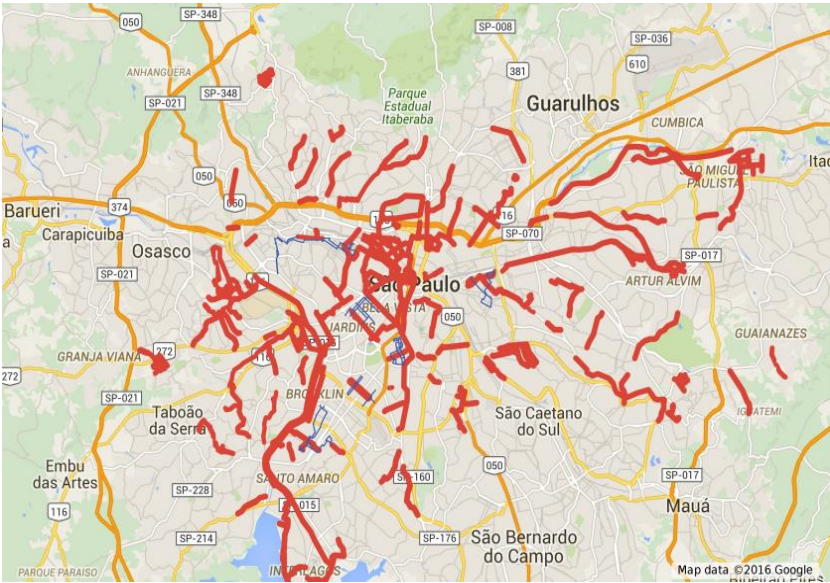


Figure 10.3. Bike paths and lanes in São Paulo.

Two structures of the Central and Western zones corroborate the tendency to increased bicycle use in these regions.

Location/ Year	2010 – without	2012 – without	2014 – Eliuseu de	2015 – Paulista	2015 – with bike
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⁹⁴ Counts carried out by *Ciclocidade* - Urban Cyclists Association of São Paulo (2015b).

	bike path	bike path	Almeida Av. with bike path	Av. still without bike path	path on both avenues
Paulista Avenue	733 bike trips	701 bike trips	-	977 bike trips	2112 bike trips
Eliseu de Almeida Avenue	561 bike trips	580 bike trips	888 bike trips	-	1245 bike trips

Table 10.3. Trips per bike path.

Final Considerations

Since redemocratization, Brazil has advanced in the consolidation of legal milestones that guarantee more urban quality of life for Brazilians. From the Federal Constitution up to the new Brazilian Traffic Code (BRASIL, 1997); from the City Statute to the National Policy on Urban Mobility. While the utilitarian vision of transporting people and cargos, in force for most of 20th century, was aligned with the development agenda for the motorization and sprawl of our cities, today the paradigms address the resumption of energy and of human scale as key elements for human mobility of a country that each day is increasingly more urban.

The existence of a thriving and diverse national industry of the bicycle sector, since the 1950s, could guarantee some of the solid foundations for the consolidation and growth of a bicycle culture in small- and medium-sized Brazilian cities, and in metropolises. In this way, the inclusion and access to this agile and democratic means of transportation by the overall population would be ensured, especially by those who should receive greater attention and support from social wellbeing public policies.

The positioning of the market, stimulated by changes in consumption patterns, increase of the average income of Brazilians and

also by the changes in the cyclists' profile in Brazilian cities, reinforced the tendency to the shrinking of the popular bicycle culture and, therefore, of the motorization growth in the country.

There is also a profound lack of understanding of the urban mobility agenda, followed by responses consistent with the challenges and complexity of 21st century. Lack of understanding on the part of public management, which accumulates inconsistencies related to: a) the federal pact, which does not guarantee the capacity for institutional, financial and budgetary response and the formulation of public policies by municipalities; b) macroeconomic policies, which conflict the guidelines of the national urban mobility policy with incentives to the automobile industry; c) the redesign of public investments, so far oriented according to the paradigm of the highways culture and motorization.

It is curious to note that the actors themselves involved in the practical change towards the agenda of a new city and urban mobility, people who just have a strategic role in cities, still do not have a more critical and deep understanding of the disastrous paths resulting from loss of identity and bike culture in the country. If, on the one hand, the popularization of the cycling infrastructure was elevated to the level of one of the main measures to respond to the expectations of this new contemporary agenda of urban mobility - consolidated by the legal milestones highlighted here - on the other hand, the diffuse interests led by the motorization agenda of the country continue to dominate the agenda of public policies and investments. As a result, the fragile and historical bicycle culture in the country is currently on the verge of its own extinction.

The benefits of cycling infrastructures, however, are numerous and must be the object of a further investigation, both by scholars, professionals of the area, activists, and the public power itself. There is already a framework of knowledge and accumulated data to carry out better policies - whether for the existing structures already implemented, whether for others in the future. Nonetheless, it must be

pointed out that policies for implementing cycling infrastructure, when and if implemented in an isolated way, do not appear to be sufficient to contain the modal migration from the active means of transportation to the motorized means of transportation (individual, especially).

This is what is noted from the analysis of the survey data of the Profile of Those Who Use Bicycles in the City of São Paulo (2015), combined with data from the Mobility Survey (SUBWAY, 2012), with the cyclist counts and the increasing motorization rate and fall in production of basic bicycles, a popular bicycle for workers and employees. It is necessary, however, to conduct further investigation on the location of groups that migrated from the bicycle to the motorized means of transportation to understand the motivations (even of sociological nature) for such a phenomenon.

Urban tensions such as the generous supply of urban structure for the circulation of cars and motorcycles, the low supply and/or quality of public transport and the high tariffs of the latter, the numerous exclusions and the induced urban sprawl - segregating, distancing and encapsulating millions of Brazilians in a suburbanization situation - at the same time that the possibility of purchasing a car or a motorcycle is publicized as a measure of inclusion and social rise and, at least for the short and medium term, set aside the expectations of restraining modal migration and the daily loss of cyclists, especially in the peripheries. Nonetheless, from 2013 to 2016 there was a huge breakthrough in the implementation of cycling infrastructure in the city of São Paulo.

In order to make the bike a more and more “fast and convenient” means of transportation in the city of São Paulo⁹⁵, according to 48% of those who used bicycles and claimed that speed and convenience were their main motivation for starting cycling in the city, it will be necessary

⁹⁵ According to the survey on the *Pesquisa Perfil de Quem Usa a Bicicleta na Cidade de São Paulo* [Profile of Those Who Use Bicycles in the City of São Paulo (CICLOCIDADE, 2015).

to face physical and symbolic barriers of the highway dynamics developed throughout 20th century.

In order to make the bike an increasingly democratic and accessible means of transportation, it will be necessary to address the lack of respect for cyclists on the part of motorized drivers and the lack of traffic safety⁹⁶ which, combined, account for 60% of the main issues faced by those who use bicycles in the city of São Paulo.

Therefore, if we do not face the dominance of motorization in the country and in the city of São Paulo, the greed for more and more space by the big energy spenders (ILLICH, 2005), if the agenda in search of more human cities, with diverse connections and designed for a human scale, and if the implementation of cycling policies does not embrace all this accumulation, our efforts will have possibly been in vain; and in the near future, we will painfully have to rebuild from the ashes the rich and diverse bike culture that was being developed in Brazil since the 1950s.

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⁹⁶ According to the Profile of Those Who Use Bicycles in the City of São Paulo (CICLOCIDADE, 2015).

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Chapter 11. Women on their bikes: how women cycle in São Paulo

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Introduction

In recent years, the bicycle has been incorporated into the urban mobility policy agenda of São Paulo. This incorporation occurred in a gradual way until the early 2010s and reached greater intensity from the municipal management that began in 2013. Motorized individual transport started losing its hegemonic position in urban mobility policies, and collective and active modes gained some priority in road infrastructure interventions. In this process, the cycling system remarkably expanded. In addition to the impressive increased road network that reached approximately 400 Km, it was the first time that the automobile's place in the city was questioned and altered with the transformation of road parking lanes into bike lanes. Still, what has been achieved remains quite insignificant compared to the road system extension - about 17000 km of roads.

This local context, inserted in the national and global context for the promotion of cycling mobility, has made the discussion about bike use even more relevant. Considering the scarcity of data on bike use in São Paulo and seeking to produce information that can subsidize the design and implementation of public policies addressed to bike use in this city, *Ciclocidade - Associação dos Ciclistas Urbanos de São Paulo* [Urban Cyclists Association of São Paulo] (2015a) coordinated the local application of the survey on the Cyclist Profile.

Within this context, this chapter aims to investigate female bicycle mobility from the analysis of data raised by the survey on the Cyclist Profile held in São Paulo, separated by gender - considering the prevalent responses: female and male – and income ranges. To support the discussion, there were also some data from the *Pesquisa Origem e Destino da Região Metropolitana de São Paulo de 1997 a 2007* [Survey on the Origin and Destination of the Metropolitan Region of São Paulo from 1997 to 2007]⁹⁷ (OD) survey and of the cyclist counts also carried out by *Ciclocidade* (2015b). This chapter aims to clarify and discuss the female bicycle mobility pattern, in comparison with the male one, and in different income ranges, raising assumptions on the reasons for the differences and similarities between female and male mobility patterns.

This specific approach to women is justified since they use and circulate around the city in their own way, different from men (DUMONT; FRANKEN, 1977; COUTRAS, 1997; VIDAL, 2004; HANSON, 2010; RASSELET et al., 2011). Such differences result from the concept of gender (SCOTT, 1986) and from the social and cultural construction of the roles of men and women within the family and in society, that is, in aspects of a stereotypical female socialization and of the gender division of labor, which account for the different ways in which men and women experience urban space.

In relation to mobility, Hanson (2010) shows that mobility patterns form gender and vice versa and points to limitations of methodological approaches. The author also acknowledges the possible transforming power to expand women mobility within “family dualism”, in which men develop activities outside the home, in public space, with a range of movements and distances, while women are limited to private space, with restricted movements. However, even if the author brings some diversity of contexts, the greater focus is on the North-American

⁹⁷ This is the most comprehensive research on mobility patterns in the Metropolitan Region of São Paulo, both geographically and longitudinally over time. It has been held every 10 years since 1967, with measurements in the last two editions, in 2002 and 2012. Only from 1977 it started including the active modes of transport.

context, which much differs from the Brazilian and the Latin American ones. In these contexts, the analysis should be relativized, because mobility patterns are set up from local urban dynamics and are strongly impacted by socio-economic, cultural and moral aspects, including color and ethnicity, but particularly income and schooling stratification levels. These specificities have considerably hampered translation or dialogue with European and North-American literature.

Another challenge present in the debate on urban mobility patterns is the fact that the existing data, such as those from the OD survey, are generally shown without gender separation or, when this happens, with low level of disaggregation and information analyses. This makes it difficult to conduct readings on women's patterns, whether in the spatial distribution of trips or from socio-economic standpoints, even if this information exists in the survey databases on mobility patterns. Thus, although the OD historical series showed that the male Mobility Index⁹⁸ (MI) is higher than female MI for motorized⁹⁹ modes and lower for trips with active¹⁰⁰ modes, disaggregated data show internal differences within these two groups of modes. In relation to the latter, there is a greater female participation in walking trips, while men widely dominate bike use.

Investigations into gender differences in mobility patterns are rare, but some recent research has addressed these issues (SVAB, 2016;

⁹⁸ Mobility Index is the relationship between certain trips and the population that performed these trips.

⁹⁹ Motorized modes are those that use motor-operated traction, divided into two large groups: collective and individual. Collectives are the ones that carry several passengers and this concept remains despite some variation in the types of vehicles over the years. Collectives consist of: subway, train, bus, chartered transport, school bus and jitney-type minibus. Individual modes consist of: car as driver, car as passenger, taxi, motorcycle and those categorized as other, but that do not include active modes.

¹⁰⁰ Active modes are called "non-motorized" by the Subway survey. However, it is better to adopt a term whose meaning is not given in opposition to another, so that no logical priority would be established in relation to the other mode.

SVAB; STRAMBI, 2015; HARKOT; SOUZA, 2015). Of these, it is worth highlighting SVAB's work (2016) with an analysis of the differences in these patterns based on the OD survey data between 1977 and 2007. In the longitudinal analysis of the mobility patterns along the time, through a cluster analysis, the author has shown that schooling¹⁰¹ was one of the variables that mostly impacted on group differentiation.

In the separate analysis of behaviors between females and males, the author pointed out that there are significant differences in relation to family situation (household head, wife, daughter, son etc.) that proved relevant to compose a group with significant homogeneous behavior that differentiates the two groups. Especially, when a family has a larger number of children, distinctions were observed in the mobility patterns of both genders, as well as changes in the patterns related to the children's age group.

Investigation on active modes use are even rarer, modes that are usually undersized owing to the OD¹⁰² survey methodological options which incur data limitations. The existing investigations have privileged collective motorized modes, an option aligned with the mobility policies in São Paulo, both the city and the state. Over time, the individual and collective motorized modes have been privileged by these policies through road network expansion, despite the high proportion of commutes with active modes throughout the entire historical OD series, about one-third exclusively performed on foot¹⁰³.

Cycling Policy Panorama in São Paulo

¹⁰¹ In this period, the country showed a large increase in schooling levels (ARRETCHE, 2015).

¹⁰² For the survey methodological limitations, see Lemos et al. (2016).

¹⁰³ The OD survey accounts for trips exclusively performed on foot, i.e. trips with no integration with any other mode, and whose distance was greater than 500m, except for trips whose destination was work or study.

Only in the 21st century the bicycle was concretely inserted into the urban mobility public policy agenda in São Paulo, facing the difficulties inherent in a late implementation process in a city with a strong automobile-centered urban development. Bicycle use as a means of transportation was slowly settling in the first decade of the 2000s. From the 2012 municipal elections, this picture has changed. The strong performance of *Ciclocidade* and the *Instituto CicloBr* to include cycling mobility policies in programs of candidates to the municipal government of São Paulo contributed to the beginning of important changes, since six candidates signed letters of commitment stating that, if elected, they would transform São Paulo into a more cycling city by adopting a series of proposals (CICLOCIDADE, 2012).

The Municipal Executive Power began its management including in the *Programa de Metas 2013-2016* [2013-2016 Program of Goals] (PREFEITURA DE SÃO PAULO, 2013) the construction of 400 km of permanent cycling infrastructure to be completed until the management end in 2016. The first year was marked by civil society mobilizations, known as “*Jornadas de Junho*” [“June Days”], which led to the increase of more than 15% in the bus fare value, and resulted, among other achievements, in the implementation of this Program item.

While in previous phases of public policy the space for the automobile remained untouched, from that moment on this situation changed as a result of the new cycling policy. Bike lanes¹⁰⁴ in places previously addressed to car parking were the main typology adopted by *Companhia de Engenharia de Tráfego* (CET) [Traffic Engineering Company] (2014a; 2014b) in this management, although spaces for individual motorized modes still predominate. This option widely impacted on the media and public opinion, both positive and negatively, but it helped to broaden the debate on the unequal division of circulation space.

¹⁰⁴ Lanes for bicycle circulation with low level of motorized traffic segregation.

Women Cycling Mobility in São Paulo

Despite the expansion in the cycling policy implementation in São Paulo, the delay in the incorporation of bicycle space, associated with the pattern of intense and sprawled growth of the city throughout the 20th century, automobile-centered, contributed to a low representativeness of bicycle use in population daily trips, particularly when we consider trips performed by women, restricting the analyses on different bike uses. Prior to data analysis of the survey on the Cyclist Profile, from a gender perspective, some data from the main mobility survey carried out in São Paulo will be briefly presented.

We propose a brief discussion about some general data on bicycle commute in this city, particularly in relation to the female gender/sex cyclists. For this preliminary analysis, two surveys were adopted: (i) the OD, carried out by the Subway¹⁰⁵ and (ii) the cyclist counts that have been periodically performed by *Ciclocidade* (2015b) since 2010, based on the NGO's *Transporte Ativo* methodology.

The two surveys show that the proportion of women using bicycles in the city of São Paulo is quite low. According to the OD survey, the proportion of female trips with active modes has been higher since 1987, but the disaggregated trip data by the main mode¹⁰⁶ show that this occurs only for the walking mode. Besides, the survey shows that there

¹⁰⁵ Despite the limitations highlighted by Lemos et al. (2016), it was chosen to use them to carry out some general readings of the mobility patterns in São Paulo, giving support and context to the analysis of the survey on the Cyclist Profile data.

¹⁰⁶ The main mode is the mostly used mode in the same trip that, according to the Subway criteria, has the highest hierarchical level. The hierarchy adopted in 2007 follows the following order: subway, train, bus, chartered transport, school transport, taxi, car as driver, car as passenger, motorcycle, bicycle, other, and, finally, on foot. This method undervalues the modes with lower hierarchy, since they are hidden by the larger hierarchy.

is a male supremacy in bike use in every historical series (Chart 11.1)¹⁰⁷, and the proportion of female trips is below 10% and it only increased in 2012.

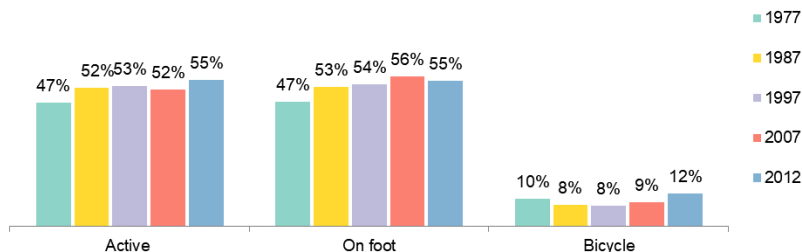


Chart 11.1. Proportion of women's trips according to active modes (according to the main mode). Source: Author's elaboration from the OD survey databases of 1977, 1987, 1997 and 2007, and from Aferição de Mobilidade [Mobility Measurement] database in 2012.

Cyclist counts reinforce the OD data, showing a rather low proportion of women cyclists. On Paulista Avenue, for example, a place that presented the highest proportion of women cyclists in 2015, reached only 14%, while in other places this proportion is not more than 2%. However, it is remarkable to note how this proportion increased over time. By 2015, *Ciclocidade* had held counts in nine points of the city, but only two locations with historical series, where there were three or more counts: Paulista Avenue and Elisha de Almeida Avenue.

¹⁰⁷ Predominance of male bike trips also occurs in motorcycle trips, the two vehicles with the highest number of traffic deaths per trip. Considering absolute numbers, cyclists have relatively low participation in traffic deaths, but relating this result to the number shown in the OD Survey, the pattern changes. In 2007, this relationship showed that cyclists are the second most vulnerable group, with 27 deaths every 100,000 trips, behind only motorcyclists with 39 every 100,000 trips.

On both routes, the first count was carried out in 2010 and the last one in 2015, and cycling infrastructure was implemented subsequently to the first count¹⁰⁸. Between the first and last count carried out on Elisha Avenue, there was a growth of 122% in the total of cyclists and an extraordinary increase of 1,444% in the total of women pedaling, ranging from 9 in 2010 to 139 women in 2015. In São Paulo, the general increase in the same period was 188%, while women accounted for 1,004%.

The OD survey also showed a growth in that same period of the counts. Chart 11.1 shows a systematic fall in the proportion of female cycling trips in the first three years of survey, which grew again from 2007, reaching the highest proportion of the entire historical series in 2012, thus suggesting a trend of an increased proportion of women. Moreover, and despite the fall observed until 1997, female MI for bicycle trips grew steadily throughout the entire historical series, which was confirmed in the 2012 count, with a slight increased trend. On the other hand, male MI greatly increased by 2007, but slightly decreased between 2007 and 2012.

The year 2012 was the last of the third phase established by Lemos and Wicher Neto (2014). According to the authors, this is the moment when some infrastructure starts being implemented in a more comprehensive and systematic way. This might suggest that there is a direct relationship, or even a dependency, between infrastructure implementation and the adoption of bike use as a mode of transport by women and girls. However, it should be emphasized that what had been implemented up to 2012 was less than 1% of the road network and did not result in a network for cycling. Moreover, this implementation presented several issues, such as low accessibility or lack of safety for cyclists (see LEMOS; WICHER NETO, 2014). But when we analyze the entire scenario, we note the beginning of a pro-bike policy

¹⁰⁸ The work on Elisha de Almeida Avenue was completed in January 2015. On Paulista Avenue, in August 2015.

implementation and the emergence of a civil society that faced a broader mobilization and organization associated with striking events¹⁰⁹ that took place at that time.

Data show that the proportion of bicycle trips performed by women was much smaller when compared to those by men and that areas¹¹⁰ featuring female cyclists are also much scarcer. The maps¹¹¹ below also show that, for both genders, the most peripheral areas in relation to the Southwestern Quadrant¹¹² are locations with the greatest number of bicycle trips performed by dwellers, reinforcing that bike use is much associated with a smaller family income, without any difference related to gender. For female cyclists, *Jardim Helena* [Helena Garden] is the OD zone whose residents present the largest number of trips in 2007, at the Eastern end of the municipality.

¹⁰⁹ In addition to *Bicicletadas*, Brazilian version of the San Francisco Critical Mass in the USA (see BENNICCHIO, 2012), and among the various deaths of cyclists in São Paulo traffic highlights were three deaths that had great disclosure in the media in this period. Although being negative events, they helped to bring bike use to the public debate and possibly promote a reactive movement, encouraging the use of this mode of transport (ZÜGE JUNIOR, 2015).

¹¹⁰ Trip data are usually spatially distributed according to the origin or destination zones of the trips, thus allowing the visualization of these occurrences. In this analysis, we preferred to use residence zones, showing where bike users dwell.

¹¹¹ The OD survey data were spatially distributed, separated by gender and residence zone – to demonstrate where bike users dwell –, and the scaling was given by the number of trips carried out by dwellers. As data limitations make it impossible to read widely and longitudinally in time the spatial distribution of trips, and to compensate for the limitations and enable an analysis of the cyclists' residence location in the MRSP, we mapped the accumulated data in time.

¹¹² *Quadrante Sudoeste* [Southwest Quadrant] is the location that Villaça (1998) defined as “a region of high concentration of higher-income layers” (RGCCMAR), and he argues that this part of the city is its Central Zone, in the sense that it concentrates infrastructure, services and especially better urban conditions (VILLAÇA, 1998 AND 2011; VILLAÇA AND ZIONI, 2007). This region also contains a greater concentration of jobs, and Bessa (2014) called it the corporate center of the metropolis, thus supporting the idea of this area centrality.

The low historical proportion of bicycle trips performed by women, shown both in the OD survey and in the cyclist counts, was identified as one of the main challenges of the survey on the Cyclist Profile conducted in São Paulo, thus helping to define the field methodology. Researchers were requested to prioritize women cyclists in the interviews.

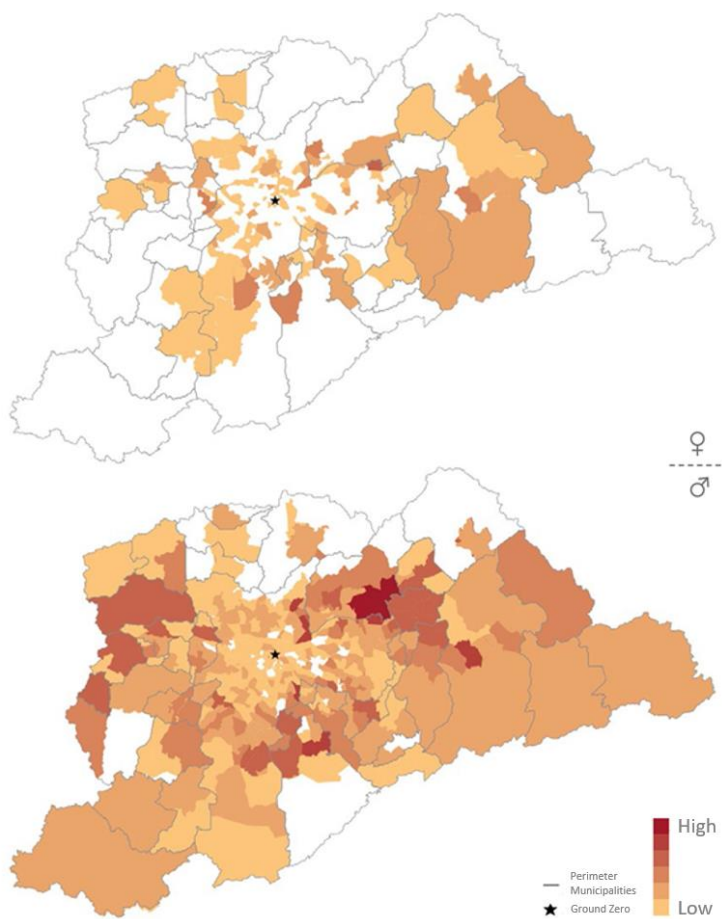


Figure 11.1. OD occurrence of bicycle trips, data accumulated in time (1977 to 2007) and spatialized by gender. Source: Author's elaboration from the OD survey databases of 1977, 1987, 1997 and 2007, and from the *Aferição de Mobilidade* [Mobility Measurement] database in 2012.

Survey on the Cyclist Profile

The survey on the Cyclist Profile conducted in São Paulo raised data on who rides a bike in the city in a more qualified way than that of the OD survey, and it was better distributed in the territory than the counts. Like all investigation, it presented some methodological limitations, but this section will only focus on its results. The survey divided the city into three major areas¹¹³, namely central, intermediate and peripheral, as shown in the map below, and divided the count points into three types: (i) ‘with cycling infrastructure’; (ii) ‘without cycling infrastructure’; and (iii) ‘location with intermodality’.

Since the beginning, there was a concern with the low rate of women who use the bike as a means of transportation. Given this, the survey local coordination chose to prioritize women in the approach¹¹⁴ to ensure a minimally representative sample of that group. Despite this procedure, only 14% of the people interviewed were women. Considering the zoning proposed by the survey, about half of the women were interviewed in the area called “Central”, almost 30% in the “Intermediate” and about 20% in the “Peripheral”. However, this female distribution points to a concentration in the Southwest Quadrant, an information that differs from the OD historical series data.

¹¹³ The survey zoning seems to have used Ground Zero as a reference, setting up a radioconcentric periphery demarcation in relation to that point. Although being the historical center of the city, it does not incorporate socio-economic issues related to the territory, as shown by Villaça (1998; 2011) and Villaça and Zioni (2007).

¹¹⁴ One of the limitations of the survey applied in São Paulo was the priority of approach given to women in the questionnaire application. The goal was to achieve the highest possible number of women in the sampling as, according to the available data, their participation in bicycle commutes was low. This was important, on the one hand, to get a minimum sample of this group, but on the other, it did not allow to infer the proportion of women who use bicycles as a means of transportation in São Paulo.

The interview points located farther from the historical center recorded a lower proportion of women, as shown in Chart 11.2 below. On the other hand, the entire OD historical series recorded a more intense bike use, women included, in these more peripheral locations.

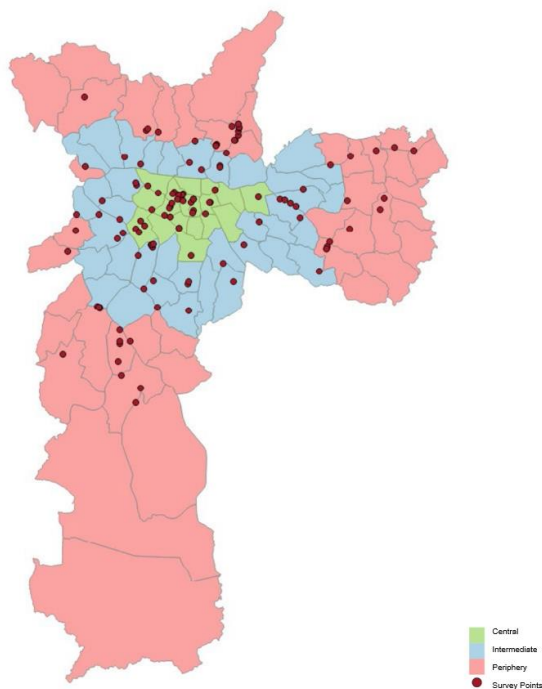


Figure 11.3. Survey Zoning of the São Paulo Cyclist Profile and Interview Locations. Source: Author's elaboration from the São Paulo Cyclist Profile survey database - 2015.

The interview location in Jardim Helena, for example, a neighborhood with intense bike use, women included as well, presented a fairly low proportion of women, about 7%. This result points out that the survey on the Cyclist Profile qualifies the information regarding the

city cyclists but is unable to define the actual proportion of women cyclists in São Paulo.

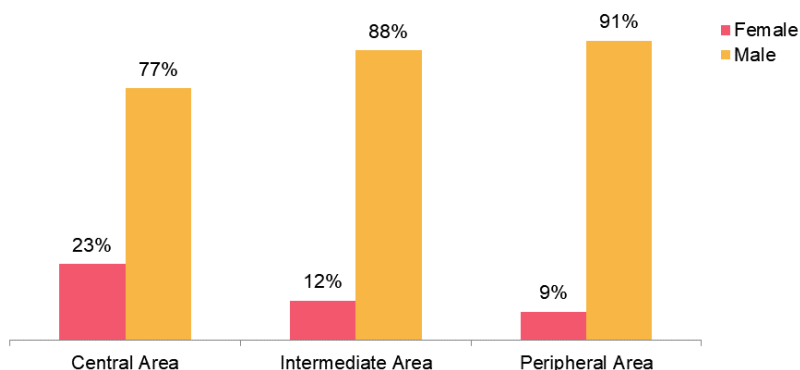


Chart 11.2. Proportion of respondents, according to city zone and gender. Source: *Pesquisa Perfil de Quem Usa Bicicleta na Cidade de São Paulo* [Survey on the Profile of Those Who Use Bicycles in the City of São Paulo], *Ciclocidade* (2015).

Given this, the analyses in this chapter addressed the qualitative nature of the survey on people who use bicycles in São Paulo and their commutes rather than the territorial distribution of the interviews¹¹⁵. Considering that in São Paulo the average income of a region indicates better urban conditions (VILLAÇA, 1998; 2011; VILLAÇA; ZIONI, 2007), and that people with lower income live in worse urban conditions, even when they can access places with better conditions, we chose to analyze the survey results from the income ranges of the interviewed cyclists. The interviewed women had, on average, higher income than men – 48% of women had income above 3 M.Ws. (Minimum Wages), while for males the ratio was 28%, as it can be seen in Chart 11.3 below. Women also presented higher levels of schooling

¹¹⁵ The survey provides information on the location where cyclists were approached by the researchers, but not their residence location. That is, it is possible to analyze these data looking at the region of the city in which that specific cyclist was circulating but establishing limits to the analysis of socioeconomic relations in the territory.

than men, and 63% of them had complete graduation or post-graduation degrees, to the detriment of only 32% of men¹¹⁶.

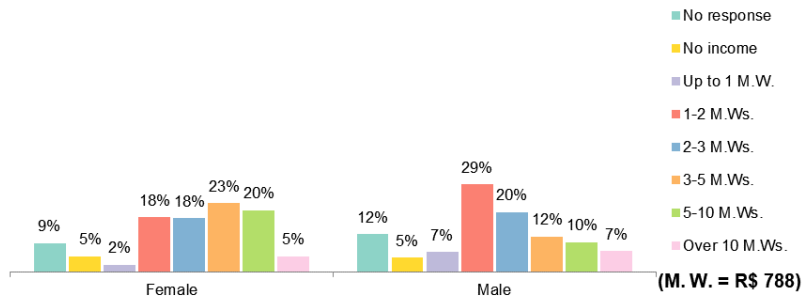


Chart 11.3. Distribution of respondents, according to income range and gender. Source: Survey about the Profile of Those Who Use Bicycles in the City of São Paulo, *Ciclocidade* (2015).

Bicycle frequency use among respondents does not appear to differ between genders and income ranges. Chart 11.4 below shows that about 40% of the overall respondents use bicycles five times a week, but there is some difference concerning more frequency use in which 26% of women and 36% of men claimed they cycled six days or more per week.

¹¹⁶ Zoning served as the basis for defining the points of interviews and, despite presenting a good coverage of the territory, compared to other surveys focusing on bicycle use, as the counts, it failed to reach the most distant territories. This is a possible explanation for the highest income standard of cyclists interviewed by this survey, when compared to those raised by the OD survey.

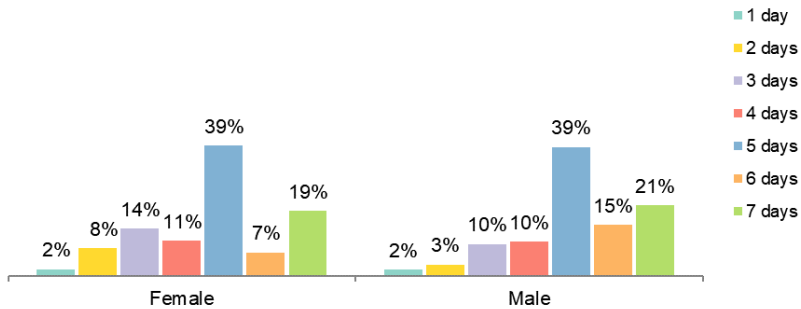


Chart 11.4. Distribution of respondents, according to how many days a week they use the bicycle as a means of transportation and according to gender. Source: Survey about the Profile of Those Who Use Bicycles in the City of São Paulo, *Ciclodidade* (2015).

The reason for bicycle trips also showed gender and income differentiation. While bicycle commute to work showed a similarity between men and women, with about 80% of respondents informing that they used the bike for these trips, bicycle commute to shopping showed a symbolic difference. Chart 11.5 below shows that, on average, 42% of the interviewed women indicated that they pedaled to the shopping location at least once a week, but the average for men was only 27%.

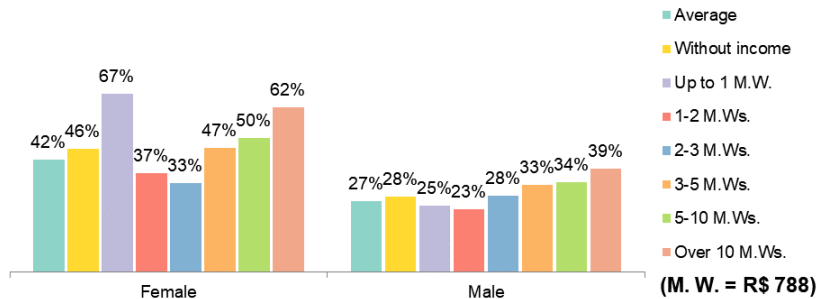


Chart 11.5. Distribution of respondents according to income in relation to the motivation of cycling to “shopping” at least once a week. Source: Survey about the Profile of Those Who Use Bicycles in the City of São Paulo, *Ciclocidade* (2015).

While for women there was no striking indication that bicycle trips for shopping grows in relation to income, for men this tendency is more constant, even if it is limited to about 40% in the highest income range. The female proportion in this range exceeds 60%, but the highest proportion is of women with income up to 1 M.W., reaching 67%. This difference bears witness to the work division of gender within households, non-equitable division of unpaid work, care of the house and children (PISCITELLI, 2009). However, the particularity found in the male cut may indicate a tendency to a shift in the highest-income population. There is also another difference between genders when women started using the bike, but not in relation to income, as shown in Chart 6 below. More than half of the women claimed to have been using the vehicle for less than 1 year, and about one-third less than six months, while nearly half of the men adopted this mode more than two years prior to the interview, with approximately 30% claimed its adoption more than five years. In other words, men showed they were older users of bikes, regardless of income.

However, among women, the non-income group presented the highest proportion of use of this vehicle for more than five years, just above 30%, while for women with higher income, above 10 M.Ws., this proportion within this time cut is limited to 15%. Although the impossibility of drawing conclusions, this suggests that the relationship with income is stronger for women cyclists.

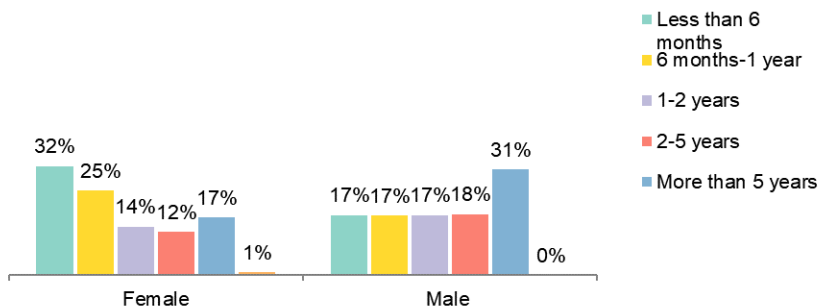


Chart 11.6. Distribution of respondents, according to time of bike use as a means of transportation and according to gender. Source: Survey about the Profile of Those Who Use Bicycles in the City of São Paulo, *Ciclocidade* (2015).

However, among women, the non-income group presented the highest proportion of use of this vehicle for more than five years, just above 30%, while for women with higher income, above 10 M.Ws., this proportion within this time cut is limited to 15%. Although the impossibility of drawing conclusions, this suggests that the relationship with income is stronger for women cyclists. Data on the motivation to start using the bike, or to continue using it, did not show great differences between genders. The most frequent was the convenience or speed of the bike, with a percentage of 42% of women and 48% of men indicating this reason. In relation to the use of the circulation infrastructure and the bicycle-sharing road with motorized vehicles, there seems to be a connection with income, for women. That is, regardless of income, men share the road, while this behavior is less common among women with lower income. The reasons for this situation need further investigation, but it is possible that the explanation is to be sought in the relationship between income and better urban conditions (VILLAÇA, 1998; 2011; VILLAÇA; ZIONI, 2007). In this sense, the best urban conditions can include

characteristics of the road system that allow a larger share in places with higher average income.

Regarding traffic safety, 54% of women, with higher-income (above 10 M.Ws.), evaluated it as good or very good, while less than 40% of men in that same income range shared the same evaluation. This information dialogues with the assumption of a relationship between territory and income, but no conclusions can be drawn yet. Thus, it is possible to assume that, since most of the women were interviewed in the area defined as Central (51%), these respondents probably circulate through locations with better quality infrastructures.

Women also associate bike use with other modes of transport and this association is made more often by women than by men, 35% against 27%, and this difference increases in the highest incomes of women. Little more than half of the interviewed women, with income above 10 M.Ws. claim that they perform intermodality in some of the weekly trips, while this proportion is limited to 30% for men. The main mode used together with the bike, for both genders, is the subway, followed by train in the lower incomes, and the modal shift of the subway with buses for higher incomes, especially for women. This relationship of intermodality also dialogues with the supply of infrastructure in the territory, as it is the case of the train in the most peripheral neighborhoods which are, therefore, neighborhoods of lower average income.

There are subtle differences in the pattern of time spent on bike trips, illustrated in Chart 11.7 below. Women and men's bike trips have varying time lengths that usually last from 10 minutes up to one hour, with a slight increase in the female group in shorter trips and in the male group in longer trips. Thus, the average time of the most frequent bike trip is slightly lower for women (29 minutes) than for men (34 minutes). In addition, while the proportion of men cycling more than 7 kilometers is 40%, in women this proportion is 26%. Although this proportion is lower than that found in men, the survey shows that about one fourth of women cycle long distances. This significant proportion

of women and men performing long, and time-consuming bike trips, indicates that cycling policy instead of creating a system that will only feed high capacity modes, should create a system that would also allow door-to-door bicycle use.

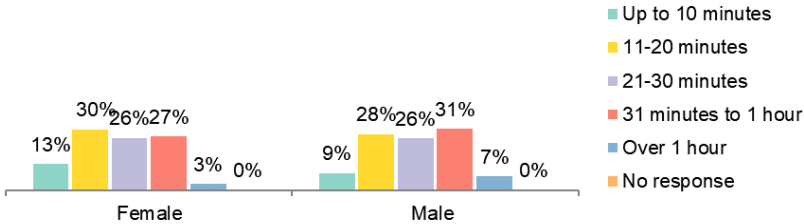


Chart 11.7. Distribution of respondents, according to more frequent cycling travel time and according to gender. Source: Survey about the Profile of Those Who Use Bicycles in the City of São Paulo, *Ciclocidade* (2015).

One of the main questions in the debate on gender issues, regarding bicycle use, is that the great solution to encourage women to use this mode as a means of transportation, often advocated in a hegemonic way, would be the supply of cycling infrastructure. Data from the survey in São Paulo contributed to broadening this debate. Firstly, the supply of cycling infrastructure, as an important motivation for increasing bicycle use, did not present a relationship with gender and was indicated by about half of respondents, regardless of gender and income.

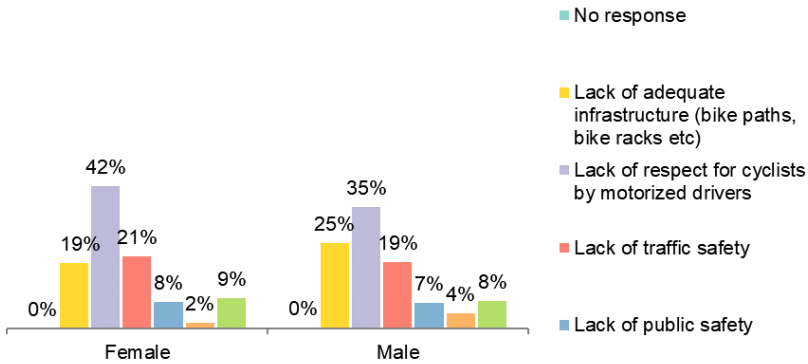


Chart 11.8. Distribution of respondents, according to major issues faced and according to gender. Source: Survey about the Profile of Those Who Use Bicycles in the City of São Paulo, *Ciclocidade* (2015).

However, the main issue pointed out, mainly by women (42%), but also by men (35%), is lack of respect for cyclists by motorized drivers, while lack of infrastructure is pointed out by only 19% of women and 25% of men, as shown in Chart 11.8 above. This indicates that there is a perception that bike segregation is a solution to the issue of traffic education, reinforcing the need to pave the way for a more comprehensive approach to cycling policies.

Final Considerations

This article aimed to discuss some questions about the pattern of bike use, having as its common thread the differences between the female and male genders. It has been shown that, despite the very small number of female cyclists in São Paulo compared to the number of male cyclists, women have gradually started adopting this mode, occupying the newly implemented infrastructures.

Moreover, data from the OD historical series showed a higher concentration of cyclists in peripheral locations distant from the historical center or from higher income classes, indicating that bicycle use decreases according to income. Conversely, the survey on the Cyclist Profile showed a different reality, particularly for women, which can be a result of a few specific limitations in the survey. This survey was also important to illustrate and discuss gender differences within the family, bringing information that reveal that the use of bicycles for supply activities (access to the shopping location) is more frequent among women than men, for example.

Besides, women seem to be more recent supporters of the bike, which suggests that they have been more influenced by the recent cycling-inclusive policies.

However, it should be emphasized that, even with the recent actions of the municipal management, the cycling “network” is still small, about 2% of the total kilometers of roads for cars. This supports the questioning about how infrastructure, as a safety guarantor, can encourage the adoption of the bicycle as a mode of transport. Or perhaps, how it can have a subjective impact on women so that the bicycle can emerge as a real option for their urban mobility. In this sense, it seems more important to implement cycling policies, including the suppression of some space dedicated to cars, with an impact on an urban transportation plan that is more ideological than concrete.

On the generally prominent idea – of the imperative of the supply of cycling infrastructure to promote the adoption of the mode by women – research indicates not only that this would be important to everyone, regardless of gender, but also that there is an understanding, on the part of the population, that this is the solution to problems of other natures, such as respect and traffic education.

This issue is important to broaden the debate, given budget and time limitation that make impossible to guarantee the infrastructure for cyclists in the overall roads. In addition, policies addressed to road safety, calming traffic and traffic education issues can be more

comprehensive in relation to the territory and in relation to the needs of all active modes of transport, in addition to broadening the safety of motorized users.

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