

© 2015 Elena Bonicelli

SOCIAL SUSTAINABILITY AND MOBILITY IN CURITIBA: BUS RAPID TRANSIT IN  
THE “GREEN CITY” OF BRAZIL

BY

ELENA BONICELLI

THESIS

Submitted in partial fulfillment of the requirements  
for the degree of Master of Arts in Latin American Studies  
in the Graduate College of the  
University of Illinois at Urbana-Champaign, 2015

Urbana, Illinois

Adviser:

Associate Professor Brian Deal

## **ABSTRACT**

This project is an analysis of the policies, plans and programs implemented in the city of Curitiba, Brazil, in the field of public transportation and urban planning. My conclusions have instructive relevance for urban policy formation, especially in the Global south, where Curitiba is heralded as a model "green city" to be emulated by governments whose unstable financial realities demand effective, short- and medium-term projects to serve rapidly changing populations. My thesis analyzes a diverse body of evidence produced since the 1960s: the scholarship of Brazilian and non-Brazilian academics; the published documents of municipal public bodies and international organizations; and my own interviews of current city residents and users of the bus system. I focus on the Bus Rapid Transit system, and related programs and policies that drew international recognition for Curitiba as a sustainable and inclusive city. I explore the shortcomings instead of adding to praise. While scholars, local politicians and planners and international organizations describe a model city, Curitiba's residents and public activists paint a different picture of their city. I find that Curitiba is still a viable model, but one that should not be replicated without considering new solutions to its social justice shortcomings. This work contributes to scholarly and public discussions about urban and social sustainability policy, and environmentalism in Latin America, and globally.

## Table of Contents

<b>LIST OF FIGURES</b> .....	<b>IV</b>
<b>INTRODUCTION</b> .....	<b>1</b>
<b>CHAPTER 1: SUSTAINABILITY AND SUSTAINABLE TRANSPORTATION: A LITERATURE REVIEW</b> .....	<b>11</b>
1.1 DEFINITIONS AND DIMENSIONS OF SUSTAINABILITY .....	11
1.2 URBAN SOCIAL SUSTAINABILITY .....	15
1.3 SUSTAINABLE TRANSPORT.....	17
1.3.1 <i>Definitions and Dimensions of Sustainable Transportation</i> .....	18
1.3.2 <i>Strategies for sustainable transport</i> .....	22
1.4 MY APPROACH.....	24
<b>CHAPTER 2: CURITIBA, THE MODEL SUSTAINABLE CITY AND THE BRT. LITERATURE REVIEW AND FIELDWORK</b> .....	<b>25</b>
2.1 THE CONSTRUCTION OF CURITIBA AS A MODEL SUSTAINABLE CITY .....	25
2.2 HISTORY OF CURITIBA AND ITS PLANNING .....	27
2.3 BUS RAPID TRANSIT (BRT) SYSTEMS .....	31
2.3.1 <i>BRT in Curitiba</i> .....	35
2.4 FINDINGS OF MY INTERVIEWS .....	38
2.5 SCHOLARS' CRITIQUES TO THE CURITIBA MODEL.....	42
2.6 FUTURE CHALLENGES AND DEVELOPMENTS.....	44
<b>CHAPTER 3: CASE STUDIES AND POLICY RECOMMENDATIONS</b> .....	<b>46</b>
3.1 CASE STUDIES.....	46
3.1.1 <i>The Transmilenio system in Bogotá, Colombia</i> .....	46
3.1.2 <i>The Transantiago system in Santiago del Chile</i> .....	50
3.2 POLICY RECOMMENDATIONS .....	52
<b>CONCLUSIONS</b> .....	<b>58</b>
<b>BIBLIOGRAPHY</b> .....	<b>60</b>

## **List of Figures**

<b>FIGURE 1 : BRT PANORAMA BY REGION .....</b>	<b>33</b>
<b>FIGURE 2: KEY BRT INDICATORS BY LATIN AMERICAN COUNTRY.....</b>	<b>34</b>
<b>FIGURE 3: MAP OF CURITIBA’S BRT.....</b>	<b>36</b>
<b>FIGURE 4: TRINARY ROAD STRUCTURE IN CURITIBA.....</b>	<b>37</b>

## INTRODUCTION

This thesis is an analysis of the policies, plans and programs implemented in the city of Curitiba, in the southern Brazilian state of Paraná, in the field of public transportation and urban planning. It is the product of the analysis of the body of works produced about the city since the 1960s by Brazilian and non-Brazilian scholars, as well as of the documents published by municipal public bodies and international organizations, to advertise Curitiba as a case study to follow for other cities when planning their transportation system, and a model green city to look at to create a more sustainable and inclusive environment for city dwellers. In addition to this analysis, I conducted a series of interviews with city residents and users of the bus transportation system, the results of which are reported and analyzed in this thesis.

I will illustrate the solutions implemented by the municipality of Curitiba from the 1960s until today, focusing on the Bus Rapid Transit system and on the other programs and policies that made it an internationally recognized green, sustainable and inclusive city. At the same time, I will address the critiques to the model and its shortcomings. While scholars, local politicians and planners and international organizations describe a model city, Curitiba' residents tell a different story about their city. Therefore, I will address both the successful stories about Curitiba, as well the main concerns and critiques of the *Curitibanos* towards the fact that their city is such a model of sustainability and social inclusiveness. My aim is to illustrate the and give some policy recommendations on sustainable mobility and on how to build more sustainable cities, based on my knowledge of Curitiba, its BRT system and two more positive case studies in South America, Bogotá, the capital of Colombia and Santiago del Chile.

In the first chapter, I will review the literature about sustainable development and sustainable transportation. This concept can carry different connotations, depending on the dimensions considered. The view I embrace does not only consider the dimension of environmental sustainability, but also, and mainly, the social dimension of it. In a second moment I will apply these ideas on studying transportation in an urban setting. People have different ideas about what a sustainable city is and which are the aspects and the dimensions to include in planning it. Different views conduct to the design of different policies, plans and programs. I strongly believe that a sustainable city is a city where the human and natural environments can coexist. A city where the public space and the green space are not only part of the landscape but places that people can fully live and enjoy, not only in their free time, but on a daily basis. The way people move through these spaces and interact in them can significantly change their quality of life. This is why a sustainable and more human mobility, not based on car, can modify a city and the way people live the public space.

In the second chapter, I will, at first, recount and analyze the main works constituting the body of literature about the history of planning of Curitiba, with a special regard to the Bus Rapid Transit system. I also compare this history to that of other cities in the world that started developing this form of transportation. The way that this transportation and the land management system were integrated in the city of Curitiba is the main reason for its popularity at the international level and of the prizes and recognition this model received abroad. In the second part of the chapter, I will go over the main academic critiques of the model. While non-Brazilian scholars and consultants of international organizations mainly address its positive aspects, only rarely underlining its shortcomings, scholars of the Federal University of Paraná often critique the idea of Curitiba as a model sustainable city. Many of these academics who have participated

in debates about the city, starting from the 1990s, think that this model was successfully constructed through a marketing operation carried on by the municipality and other public bodies. In their view, the BRT system was an innovative idea, as well as all the other programs the municipality implemented to protect the environment and to improve the quality of life of the Curitibanos, especially the most vulnerable sectors of the population. On the other side, though, this fame is a legacy of the past and the creative push that the city once had is almost exhausted. To sustain this view, I will summarize the main opinions expressed in the interviews I conducted in Curitiba in the summer of 2014. As a result of my analysis of the answers given by the interviewees, it is clear that many people considered the transportation system in Curitiba to be efficient and safe, especially compared to other cities in Brazil. At the same time, though, many people are aware of the fact that the system is not serving all the areas and needs and that many *Curitibanos* started to rely more and more on cars to commute. On top of this, many complain about the scarcity of resources and efforts dedicated to the social, educational and health programs, as well as to the increasing segregation of the poorest among the city dwellers. This shows how the social sustainability is far from being reached.

In the third chapter, I will design policy-relevant recommendations for planners and local politicians that are considering to implement the BRT system in their cities. In order to do so, I will consider the concerns and suggestions expressed by the Curitibanos in their interviews, as well as successful cases of the construction of the BRT system in South America. I will, specifically, focus on two of the most famous case studies, the *Transmilenio* system in Bogotá, Colombia, and the *Transantiago* in Santiago del Chile.

Curitiba is globally seen as a model sustainable city. This capital of the Southern Brazilian State of Paraná has received various prizes and other forms of recognition for

integrated policies addressing land management, waste management and its “Bus Rapid Transit” transportation system. The city has been called “a model of efficient city planning” “a model of environmental planning,” “the green capital of Brazil,” “the world’s greenest city” and the “ecological capital of the world”.<sup>1</sup> Cassio Taniguchi, who became Mayor of Curitiba from 2007 to 2011, said that the city faced and still faces, threats common to most metropolitan areas all around the world, such as overcrowding, traffic, poverty, pollution and limited public finance. But he argued that the difference in Curitiba is that it was capable of developing solutions that were both creative and cost-effective.<sup>2</sup>

The main feature that has made Curitiba so famous around the world is its Bus Rapid Transit (BRT) system. The BRT is distinguished from other systems because of the infrastructure that allows express buses to run in dedicated lanes and roads. It is sometimes referred to as a “surface subway,” in part because passengers pay in advance in order to access bus-stop platforms that allow for rapid entry and exit from the vehicle. To date, 181 cities around the world have introduced it, are building it or are planning to do so in the short run.<sup>3</sup> Recent growing interest in BRT is due to the fact that cities seek low-cost, sustainable transportation solutions, as alternatives (or at least, partial alternatives) to subway systems and cars.

The bus system in Curitiba is locally known as RIT (*Rede Integrada de Transporte*), or Integrated Transportation Network. This means that the BRT, created in 1974, is only part of the public transportation system. There are five main corridors, extending radially from the city center, where the express buses run on the preferential lanes. Then there are several lines of buses that run on concentric circle, connecting the BRT lines with the other parts of the city. This

---

<sup>1</sup> Joseli Macedo, “Curitiba,” *Cities* 21, no. 6 (2004): 537.

<sup>2</sup> Cassio Taniguchi, “Curitiba and Sustainability,” In *Cityedge: Case Studies In Contemporary Urbanism*, edited by Esther Ruth Charlesworth (Oxford: Architectural Press, 2005), 198.

<sup>3</sup> Global BRT Data, accessed on March 13, 2015. <http://www.brtdata.org>.

system is the result of a private-public partnership, since the buses are owned and run by private companies, but the entire system is managed by URBS, *Urbanização de Curitiba*, a semi-municipal entity. The bus system is integrated with zoning and housing plans. Along these transportation corridors, new development must be multi-story buildings, with residential, commercial and business purposes. The furthest you go from these five corridors, the shortest the buildings become. The idea is that the density should be higher closer to where the express buses run and it should decrease as the buses lines and bus stops become less frequent.

The BRT is not the only famous feature of Curitiba. All over the world municipal governments look at Curitiba as a model of urban planning to emulate, to concurrently promote environmental sustainability and social equity. Among them, the waste management system has been considered particularly innovative. In 1989, city administrators implemented the first garbage recycling program in Brazil. Shortly thereafter, they also established a so-called “Green Exchange Program” to involve people living in informal or partially recognized settlements (*favelas*). Here, participants voluntarily collect trash and take it to collection points and exchange it for bus tickets and surplus, locally produced food. This can be seen either as an inclusive solution that makes people feel like they are building and taking care of their own city or as a perpetration of an exclusionary pattern.<sup>4</sup>

The individual who has been the main proponent of these programs reshaping Curitiba was Jaime Lerner—subsequently the first director of the Institute for Research and Planning of Curitiba (IPPUC). During the 1960s he was a recent architecture graduate who, together with other young architects and planners, imagined a different kind of city. Not a city for cars, not a city with gigantic infrastructures (ideas popular in Brazil at that time) but a place where its

---

<sup>4</sup> Clara Irazábal, *City Making and Urban Governance in the Americas: Curitiba and Portland* (Aldershot, England: Ashgate, 2005), 109.

inhabitants would be happy to live in and would improve their quality of life. He would have later become mayor of the city for three mandates and governor of the state of Parana for two.<sup>5</sup> He has been Curitiba's greatest spokesperson, elevating it from a city little known outside of Brazil to a model and brand for sustainability around the world—with him as central personality of this narrative.

All these stories about Curitiba increased my interest for this city. In more general terms, I am interested in sustainable urban development, and I wanted to find a city in Latin America that could embrace all the positive characteristics of a sustainable, socially inclusive city, where the public transportation system and sustainable mobility had a crucial role and where the quality of life of its inhabitants were taken seriously into consideration by planners, public officers and politicians. This is the kind of city I would like to live in. But it is not about my personal preferences. The world is becoming more and more urbanized: South America presents the highest share of people living in cities and this tendency does not seem to slow down. On top of that, lots of cities in Latin America have been planned around cars. Brazil is not an exception, all the opposite. The government subsidized the car industry, built infrastructures to give priority to private means of transportation and even more recently, incentives have been given to people who wanted to buy a new car. Curitiba seemed like an exception and the perfect example to look at to try to rethink at cities, at their planning and their development, to put sustainable mobility and human well-being at the center of the equation.

Reading about all these impressive projects accomplished in Curitiba made me wonder, though, if it was too good to be true. The most popular narrative about Curitiba presents it as a

---

<sup>5</sup> Dennison De Oliveira, *Curitiba e o Mito da Cidade Modelo* (Curitiba, Brazil: Editora Universidade Federal do Paraná, 2011), 13.

model sustainable city, whose policies and planning should be replicated in other cities, especially the cities that cannot count on unlimited resources. That is when I started to find some dissident voices about Curitiba being such a model city. In particular, I refer to the works by Clara Irazábal.<sup>6</sup> She acknowledges that Curitiba can justifiably be considered a model of creative, effective and cost-effective planning and management, both in Brazil and at the international level. Nevertheless, the insufficient opportunities for public participation have started to delegitimize the planning process and the city's development dynamics lost momentum.<sup>7</sup> These types of contrasting information and views made me think that a field research in Curitiba would have helped me in clarifying these doubts and understanding what was part of a marketing operation and what was not.

I spent two months in Curitiba over the summer of 2014, thanks to a fellowship I received from the Tinker Foundation and a research assistantship position from the Department of Urban and regional Planning at the University of Illinois at Urbana-Champaign. I dedicated my first two weeks there to contact people I was interested into talking with, in academia, working in NGOs, involved with civil society associations, public officers. On top of that, I spent hours on the buses everyday, to have a sense of the use of space, of the different neighborhoods, of the quality of the transportation system. Already from my direct observation I got a glimpse into the problems related to the transportation system and social inclusion, the two main focuses of my research. My initial idea, at the proposal-writing stage, was to focus on two neighborhoods for my analysis and interviews, but I soon realized that it would have been too reductive.

Therefore, I decided to interview people living in different areas, either using the bus on a

---

<sup>6</sup> Assistant Professor of Architecture, Planning and Preservation and Latino Lab Director at the Columbia University in New York City.

<sup>7</sup> Clara Irazábal, "Urban Design, Planning, and the Politics of Development in Curitiba," In *Contemporary Urbanism In Brazil: Beyond Brasília*, edited by Rio, Vicente del Siembieda, William J., eds. (Gainesville: University Press Of Florida, 2009), 220.

regular basis or mainly commuting by car, to understand which were the reasons people decided to, or not to, rely on the public transportation system. For this reason, I spent the following weeks having meetings with professors, people involved in issues of mobility and social inclusiveness, the common citizens, and conducting interviews, while getting to know the city more in depth.

The contradictory information I found before going to Curitiba was confirmed by my observation on-site, and the answers I received during the interviews and informal conversations. While Curitiba has a very high share of its population using the bus system every day, since the year 2000 it also has the highest number of cars per capita among the Brazilian state capitals after Brasilia.<sup>8</sup> This means that, even if the transportation system is considered sufficient for certain commuting and for the shares of population that can't afford to use the car every day to go to work—considering how fuel and especially parking are expensive - it is not able to address every need. All the neighborhoods are accessible by bus, but some are more and some less, and not all needs are met.

Despite the contradictions of the Curitiba model and my findings in the field, I believe that it is important to look at this case study to think about how to design a different kind of city. In a rapidly urbanized world, with over-populated, unequal and polluted cities, where cars substitute the public transportation and less invasive forms of mobility – walking and biking – Curitiba offers a good case to look at to think about space and mobility in a different way. This is particularly true for those cities that have limited resources and budgets. A city where its inhabitants use public transportation instead of a private car, is a city that is alive, where people live and care more about the public space. And it is potentially safer.

---

<sup>8</sup> Steven Moore, *Alternative Routes to the Sustainable City: Austin, Curitiba, and Frankfurt* (Lanham: Lexington Books, 2007), 153.

In my view, therefore, thinking about sustainable mobility and about ways of commuting available and affordable for everyone is not only a way to protect the environment, but it is of crucial importance to transform a city. When people spend most of their time commuting in cars, and the rest of their days in their office or at home, they start to devalue the importance of taking care of their neighborhoods of residents, and their wider city. I am not, of course, against the use of cars *in toto*. What I argue, though, is that cars cause people to be more isolated and create more segregation, especially in those contexts where owning a car can still represent a class luxury for many. While people start to change their perception about public space, they start to value more the private space, investing in improving it and making a safe space. In this way they seclude themselves more and more.

Jaime Lerner summarized the reasons why I think it is important to rethink the modern city in a TED talk he gave in 2007.

[A] “city is not a problem, it's a solution. And more and more, I'm convinced that it's not only a solution for a country, but it's a solution for the problem of climate change....Every city in the world can be improved in less than three years. There's no matter of scale. It's not a question of scale, it's not a question of financial resources. Every problem in a city has to have its own equation of co-responsibility and also a design....So, I want just to end by saying that you can always propose new materials— new sustainable materials—but keep in mind that we have to work fast to the end, because we don't have the whole time to plan. And I think creativity, innovation is starting. And we cannot have all the answers. So when you start—and we cannot be so prepotent [assertive] on having all the answers—it's important starting and having the contribution from people, and they could teach you if you're not in the right track.”<sup>9</sup> Cities are loci of change, creativity, innovation and exchange. They are the places where people and ideas come together, collide and evolve. It is here that new solutions are born and exchanged, that it is important to think about a different way of conceiving the space while thinking about the environment. Cities are responsible for a major share of gas emissions and

---

<sup>9</sup> “Jaime Lerner: A song of the city,” TED, accessed on December 14, 2014. [https://www.ted.com/talks/jaime\\_lerner\\_sings\\_of\\_the\\_city](https://www.ted.com/talks/jaime_lerner_sings_of_the_city).

pollution, as well as global warming. It is here that new ideas can start to grow to change the way we move.

New solutions do not always require huge investments and long-term goals. Small projects in a neighborhood can change and they can be replicated in other communities. Thinking about a different city and alternative mobility is not a prerogative of academics, politicians and planners. We have to look at what civil society organizations and grass-roots movements, dwellers, and bikers associations have to say and what they do on a daily basis to improve the collective space. Citizen participation in policy implementation promotes a popular stake in community projects. Individuals who feel that their city belongs to them will desire to take care of it. Experiencing the city through mobility is a vital and viable avenue for encouraging residential engagement in urban governance and reform.

# CHAPTER 1: SUSTAINABILITY AND SUSTAINABLE TRANSPORTATION: A LITERATURE REVIEW

## 1.1 Definitions and Dimensions of Sustainability

The words “sustainability” and “sustainable development” have been used very frequently by organizations and academics concerned with the current, as well as future, state of the environment and living beings. The perspectives on our environment for the next decades vary from being extremely pessimistic to being open to improvements, thanks to science and technology, as well as a shifting preferences towards more environmentally friendly patterns of economic development. There is broad global agreement about the fact that humans needs to act quickly in order to counterbalance the damages already done to nature. Innovative solutions are in great demand.

Even though worries about the state of the environment are not new, the concept of sustainability is fairly recent. The most widely quoted and used definition of sustainability is the one contained in the document resulting from the meeting of the “World Commission on Environment and Development” in 1987. This organization was urged by the United Nations General Assembly to create a commission to propose environmental strategies to achieve a more sustainable development by 2000 and beyond.<sup>10</sup> This group of experts, better known as the Bruntland Commission from the name of its chairman, came up with a report that became a reference for all the people working for a more sustainable future. Although many other definitions of sustainable development have come up, the one contained in this report remained

---

<sup>10</sup> World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987), ix.

the best-known until today. Since then, discussions about the themes of sustainable development and sustainability became very prominent in all kinds of discussions – from biodiversity to responsible food consumption.<sup>11</sup>

The definition contained in this report states that “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”<sup>12</sup> The focus here is on the needs of human beings, showing that the main concern is on an anthropocentric concept of environment, as the place where human beings live and not for its intrinsic value. In order to reach this objective and leave enough resources to future generations, the people of today must drastically change the way they have produced and consumed so far. The conflict between the use of limited resources nowadays and the needs of these resources on the side of the future generations was underlined to be not simply “a problem of science or technology, but of politics, attitudes and aspirations”<sup>13</sup>. According to this paradigm, it is essential to take into consideration in the decision-making process the implications of economic growth for the environment and the society.<sup>14</sup>

The next most famous international summit on the topic of sustainability was organized by the United Nations in 1992 Rio de Janeiro. The final product of this summit was the “Agenda 21”, an international protocol defining global sustainable policies. In the document’s final section there are recommendations for action, for policy design and program implementation. These “means of implementation” go from the need to invest more financial resources, the transfer of environmentally sound technology to the less developed countries, and suggestions

---

<sup>11</sup> Ruben Boonen, Stein Aerts and Johan De Tavernier, “Which Sustainability Suits You?” In *Climate change and sustainable development ethical perspectives on land use and food production* ; EurSAFE 2012, Tübingen, Germany, 30 May-2 June 2012 edited by Potthast, Thomas Meisch, Simon, (Wageningen : Wageningen Academic Publishers, 2012), 43.

<sup>12</sup> World Commission on Environment and Development, *Our Common Future*, 43.

<sup>13</sup> Barry Hutton, *Planning Sustainable Transport*. (London: Earthscan Ltd, 2013), 2.

<sup>14</sup> Lucas Seghezze, "The five dimensions of sustainability," *Environmental Politics* 18, no. 4 (July 2009): 540.

for the creation of legal instruments and mechanisms<sup>15</sup>. In the conference, the international community kept on underlining the issues the world is facing in terms of poverty and inequalities, but it shifted the emphasis towards pollution, greenhouse gases and climate change. One hundred fifty countries signed this document, but no binding mechanism for implementation was created, leaving this document mainly on paper and producing few consequences in terms of actual commitment<sup>16</sup>.

These two documents represent a common reference for everybody working on the environment and issues of sustainable, and they cannot be ignored. At the same time, though, there are several definitions of sustainability coming from academics and researchers around the world. I will focus here on the analysis of some works that explain in further detail the dimensions in which we can intend sustainability. Many scholars and professionals working in this field have, over the years, underlined the different dimensions of the realm of sustainability, which can be ascribed to three main sectors: the environment (or ecological), the economic and the social realms. Others have come up with more, and more specific dimensions.

The three pillars of sustainability and sustainable development – society, the environment and the economy- are inter-related. Us, people, depend on ecosystems and the services they provide. Destroying these ecosystems can lead to consequences that put our very existence at risk. Long-term and stable societies, at the same time, rely on a healthy and productive

---

<sup>15</sup> United Nations Conference on Environment and Development. *Agenda 21*. United Nations Conference On Environment And Development (UNCED), 3-14 June 1992, Rio De Janeiro, Brazil. (New York: United Nations Dept. Of Public Information, 1993), 300.

<sup>16</sup> Hutton, *Planning Sustainable Transport*, 2.

population. This means that social and economic well-being feed off each other and all this can take place only in a healthy environment.<sup>17</sup>

Goodland introduces a fourth dimension of sustainability, the human one. According to him, human sustainability means maintaining human capital, which is a private good of individuals, rather than between individuals or societies. Health, education, skills, knowledge, leadership and access to services are part of this dimension and the current patterns of over population – especially in the city – is constituting a serious threat to the existence of this kind of capital.<sup>18</sup>

In a different kind of approach, explained by Seghezzeo, sustainability can be understood in terms of place, permanence and persons. In his view, place does not only refer to the concrete, natural environment; it is also the visions of places that people have, that can be as many as they can envision.<sup>19</sup> Permanence is the dimension where planning and considerations for the future consequences of today's actions plays a crucial role and it is, therefore, the inter-generational justice dimension. With persons, he refers to a dimension where the satisfaction of individuals, as well as of the society are taken into consideration.<sup>20</sup> Sustainability can be found at the intersection of these realms if inter and intra-generational justices are respected, and if the identity of the individuals and their happiness are met.

Another approach that can be attributed to the three above-mentioned dimensions of sustainability is the triple-P concept, where the three Ps stand for People, Planet and Profit. They

---

<sup>17</sup> Tracey Strange, and Anne Bayley. *Sustainable Development: Linking Economy, Society, Environment* (Paris: Organisation for Economic Co-operation and Development, 2008), 27.

<sup>18</sup> Robert Goodland, "Sustainability: Human, Social, Economic and Environmental", [www.balticuniv.uu.se/index.php/component/docman/doc\\_download/435-sustainability-human-social-economic-and-environmental+&cd=1&hl=en&ct=clnk&gl=us&client=safari](http://www.balticuniv.uu.se/index.php/component/docman/doc_download/435-sustainability-human-social-economic-and-environmental+&cd=1&hl=en&ct=clnk&gl=us&client=safari), 2002, 1.

<sup>19</sup> Seghezzeo. "The five dimensions of sustainability," 548.

<sup>20</sup> Seghezzeo, "The five dimensions of sustainability," 549-550.

all three refers to both costs and benefits of productive, economic activities. People to the social, planet to the ecological and profit to the economic ones. The triple-P approach is widely used in the business sector and it often comes up related to corporate social responsibility. It can be easily translated to other sectors as well. The three pillars should be given equal importance in the planning phase, but different worldviews and approaches usually give priority to one dimension, while underestimating the others. This subjective point of view can lead to the inability to take rational decisions regarding the long-term consequences of their acts.

## **1.2 Urban Social Sustainability**

There is no commonly accepted definition of the social dimension of sustainability. It can refer to both the individual dimension and the collective dimensions combined, but it varies depending on the theoretical framework underneath. What makes it clearly different from the environmental one is that is immaterial, making it hard to grasp and analyze, especially quantitatively. Its place is embedded in the environment and encompasses the economy. Therefore it requires different tools to be evaluated.<sup>21</sup>

Vallance, Perkins and Dixon move forward and add some complexity to the idea of social sustainability, presenting it in a threefold schema. This framework comprises 1) a “development sustainability” that addresses basic needs, the creation of social capital, justice and equity; 2) a “bridge sustainability” that concerns changes in behavior that allow for achieving bio-physical environmental goals; 3) “maintenance sustainability” that refers to the preservation of socio-

---

<sup>21</sup> Markku Lehtonen, "The environmental–social interface of sustainable development: capabilities, social capital, institutions," *Ecological Economics* 49, no. 2 (2004): 207.

cultural characteristics.<sup>22</sup> The author's intent is to show that often these three dimensions are in conflict, since what people need (development) does not coincide with is good for the bio-physical environment (bridge) and what people want (maintenance).<sup>23</sup> These conflicts cause the identification of what is social sustainable more difficult and it is often overlooked in the policy decision process. This is why there is a need for planners to work side-to-side with social scientists and to rely not only on objective data and scientific evidence, but on "how residents interpret, and incorporate concerns about the places in which they live and the world around them" as well.<sup>24</sup>

For my analysis, I am trying to think in terms of urban social sustainability. I found useful for my analysis the definition of this concept given by Dempsey, Bramley, Power and Brown. According to them, this wide-ranging, multi-dimensional concept has not been well explored in the literature, as confirmed by the little amount of works only focusing on this topic that I could find during my research. After conducting a literature review of the works available on the issue, the authors compiled a list of the dimensions and contributory factors to urban social sustainability. Among the non-physical factors they list there are inter and intra-generational social justice; participation and local democracy; health, quality of life and well-being; social inclusion; mixed tenure; safety; sense of community and belonging; social cohesion. Among the predominantly physical factors, there are decent housing, local environment quality and amenity, accessibility to local services and green space and sustainable urban design.<sup>25</sup> My choice of listing these specific dimensions is based on the fact that these are

---

<sup>22</sup> Vallance, S., H. C. Perkins, and J. E. Dixon, "What is Social Sustainability? A Clarification of Concepts," *Geoforum* 42 no. 3 (2011): 342.

<sup>23</sup> Vallance, Perkins, and Dixon, "What is Social Sustainability?" 345.

<sup>24</sup> Vallance, Perkins, and Dixon, "What is Social Sustainability?" 347.

<sup>25</sup> Nicola Dempsey, Glen Bramley, Sinéad Power, and Caroline Brown, "The social dimension of sustainable development: Defining urban social sustainability," *Sustainable Development* 19, no. 5 (September 2011): 291.

the indicators and dimensions of sustainability, social inclusion and quality of life that I had in mind when designing the questions for the interviews that I carried on in Curitiba. I do believe that these are among the most important ambits that make a city more inclusive, sustainable and equal.

### **1.3 Sustainable Transport**

Current patterns of transportation are unsustainable. They contribute to climate change, increase in pollution, congestion and they have other kinds of ecological impacts. In order to achieve significant changes, political will and serious commitment are needed. Public bodies need to seriously invest in more sustainable forms of transportation and mobility, focusing on offering efficient and affordable public transportation as an alternative to the use of cars. This effort needs to be collective. It needs to be embraced by non-state entities as well. Private companies can be included and given incentives to invest and research on more sustainable forms of transport. Researchers and academics can give their contribution in finding cutting-edge solutions in the field of transportation. Societies need to be more aware of the issues created by the current patterns of transportation and have to change their behaviors in this matter. This process will require a lot of effort and resources on the part of all the actors involved, might they be the citizens, the public bodies in charge of the city planning and the privates involved in the transportation sector.

Discourses around the need to look for more sustainable way of transportation and mobility are fairly recent. Until few years ago, the main precursors of this new approach were the countries of North America and Northern Europe, with some remarkable examples in South America and Asia. Only more recently have other countries started to move in this direction.

China and India, with some of the most polluted and crowded cities in the world, are working to change their patterns of transportation in their urban areas. In South America, the municipalities have invested in more sustainable and affordable mean of transportation that can serve the needs of all the sectors of the population, including the ones that can count on less resources.

### ***1.3.1 Definitions and Dimensions of Sustainable Transportation***

The definition of sustainable development contained in the Bruntland report, can be extended to the transport sector. In this sense, we can intend sustainable transportation as “satisfying current transport and mobility needs without compromising the ability of future generations to meet these needs.”<sup>26</sup> The needs addressed could be intended as being the ones related to an affordable, safe and healthy mobility. This definition, though, does not offer a clear explanation of what actually is sustainable transport, since this was not its primary focus. In the following sections I will offer some definitions of sustainable transport that are considered as a reference in the sector, including an analysis of which dimensions of sustainability they are considering.

International organizations have started to address sustainable transport specifically, and not just as one of the component of sustainable development, in the 1990s. They started to define the concept, its key dimensions and the possible solutions to be addressed before it became a topic of discussion in academia. They often supported and assisted the municipalities and the states that wanted to change their approach towards transportation in researching, planning and implementing new ideas. Their focus was, at the beginning, more oriented towards an

---

<sup>26</sup> William R. Black, "Sustainable Transportation: A US Perspective," *Journal of Transport Geography* 4.3 (1996): 151.

understanding of sustainability that had to do more with the environment dimension, rather than to economic and social sustainability.

The Organization for Economic Co-operation and Development (OECD) started a project on Environmentally Sustainable Transport (EST) in 1994, with the scope of giving guidelines and recommendations, at first, to the OECD countries<sup>27</sup> and subsequently to other parts of the world. The definition of EST is a “transport that does not endanger public health or ecosystems and meets needs for access consistent with a) use of renewable resources below their rates of regeneration, and b) use of non-renewable resources below the rates of development of renewable substitute.”<sup>28</sup>

According to the World Bank’s definition, which I find more useful for my analysis, transportation should meet all the three dimensions of sustainability at the same time, and they should be the basis of transport policy. In order to meet the criteria of economic and financial sustainability, it must ensure a continuing capability to support an improved material standard of living. To respect the environmental and ecological sustainability, it must generate the greatest possible improvement in the general quality of life. Finally, to be socially sustainable, transport must be shared equally by the different components of the society.<sup>29</sup> More specifically, about this last dimension, the World Bank says that transportation should be designed in order to help people with less resources. In particular, the policies should be aimed at assisting to those modes of transport the more vulnerable groups are more dependent on. More specifically, adequate

---

<sup>27</sup> The 34 countries that are currently members of the OECD are Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

<sup>28</sup> Organization for Economic Co-operation and Development, *OECD Guidelines Towards Environmentally Sustainable Transport*. (Paris: OECD, 2002), 16.

<sup>29</sup> World Bank, *Sustainable Transport: Priorities for Policy Reform*. (Washington, D.C.: World Bank, 1996), 28.

public transport to places of employment should be provided and a higher accessibility, both spatially and financially should be ensured.<sup>30</sup>

Today's patterns of transportation are undeniably unsustainable. In the "Conference on Introducing Sustainability into Surface Transportation Planning" held in Maryland in 2010, a special committee outlined the state of the art in the sector of public surface transportation as well as to draw recommendations for future strategies. In their report, they underline how the issues related to transportation encompass various dimensions and that a lot needs to be done in order to change the current patterns.<sup>31</sup>

First of all, the current system relies on nonrenewable fuels, which cause potential fuel depletion and energy insecurity. The greenhouse gases released from the combustion of fossil fuels are the main cause of the increase of global temperature and the consequent global climate change. This can lead to an increase in the sea levels, draughts that can cause losses in terms of agricultural productions and massive migrations of people. The environmental consequences affect various dimensions: they decrease the local air quality, cause ecosystem damage and noise pollution.<sup>32</sup> All these have damaging consequences for humans' health as well and, regarding the first two, they can also have consequences in the long term that can hardly be irreversible or difficult to reverse.

In addition, the increase in traffic can lead to congestion, which is a problem that would keep on existing even if the transportation system would rely on energy efficient and less polluting means of transportation. It worsens the quality of mobility, and in more general terms, the quality of life of people that have to deal with it. A higher congestion can also lead to a

---

<sup>30</sup> World Bank, *Sustainable Transport*, 73.

<sup>31</sup> Transportation Research Board, *Integrating Sustainability into the Transportation Planning Process* (Washington, D.C.: Transportation Research Board, 2005), 2.

<sup>32</sup> Transportation Research Board, *Integrating Sustainability into the Transportation Planning Process*, 5.

higher number of fatalities and injuries, already more prone to happen when a society relies mainly on motorized transportation, and even more likely to occur when traffic is out of control and taking over the bike lanes and not respecting the rights of the pedestrians.<sup>33</sup>

On top of these negative outcomes on the environment, there are some dimensions, more related with humans and equity that are worth considering. An unsustainable transportation system is one that does not provide a high degree of mobility to all the segments of a community. Some groups are more vulnerable than others and might be excluded from public transportation either because it is too expensive, such as people with a lower income that cannot have exemptions from paying their tickets, or groups that can have a limited access to the system, such as the elderly, the disabled and the children. The exclusion or limits to use the system can be, therefore, of an economic nature but not only. This is linked to a wider discourse about the lack of equity in a society and is linked with the idea of social sustainability.<sup>34</sup>

The underuse of the public transportation system is partially caused by a dependency on private means of transportation.<sup>35</sup> The problem of car-dominance is related to a culture that sees the car as a privileged means of transportation, which started in the 1950s in the industrialized countries, and was accompanied with massive investments in car-oriented infrastructures. Seen as a mass, and therefore, democratic phenomenon in those countries and a symbol of individual freedom at the same time, it actually expanded social and economic inequalities.<sup>36</sup>

---

<sup>33</sup> Transportation Research Board, *Integrating Sustainability into the Transportation Planning Process*, 36.

<sup>34</sup> Transportation Research Board, *Integrating Sustainability into the Transportation Planning Process*, 3.

<sup>35</sup> Peter Cox, *Moving People: Sustainable Transport Development* (London: Zed Books, 2010), 31.

<sup>36</sup> Preston L. Schiller, Eric Bruun and Jeffrey R. Kenworthy, *An Introduction to Sustainable Transportation : Policy, Planning and Implementation* (London: Earthscan Ltd, 2010), 33.

### *1.3.2 Strategies for sustainable transport*

It is possible to decrease the environmentally negative outcomes related to car-dependence and a more polluting public transportation system by using renewable sources of energy, improving the efficiency of the vehicles and increasing the use of non-motorized and more efficient and green forms of public transportation.

Transport strategies and programs aimed at socially sustainability have to guarantee all users physical access to employment, education and health services.<sup>37</sup> The dimension of equity in accessibility is crucial when thinking about the implications of an unsustainable transportation system on the most vulnerable groups. When planning for sustainable transport, there are three dimensions of equity that should be considered. One is the horizontal equity, which “implies that externalities of transportation should be reduced except where they are specifically justified. This includes reducing pollution emissions and accident risk from motor vehicle use, or compensating those who bear such external costs.” In addition, this kind of equity also implies that users should ‘get what they pay for and pay for what they get’, which could involve more road and parking fees, more accurate insurance pricing, and other pricing reforms. Vertical equity, instead, is aimed at creating a higher accessibility to the users that are economically, socially and physically disadvantaged. This can be done through an improvement in the transit conditions, discounted prices on public means of transportation based on income, as well as subsidizing other forms of mobility such as bikesharing, ridesharing, walking and cycling.<sup>38</sup>

In order to avoid a transportation system oriented towards private means of transport, the routes and networks should be analyzed together.<sup>39</sup> It is crucial to see the city as a system, in

---

<sup>37</sup> World Bank, *Sustainable Transport*, 13.

<sup>38</sup> Todd Litman and David Burwell, “Issues in Sustainable Transportation,” *International Journal of Global Environmental Issues* 6, no. 4 (2006): 341.

<sup>39</sup> Schiller, Bruun and Kenworthy, *An Introduction to Sustainable Transportation*, 316.

which transportation is a network, which facilitates citizens' interaction in public spaces, and not as an independent system.<sup>40</sup> This integration of transport and land use planning has been recognized in the literature as being an essential way to reach sustainability, despite the fact that it has often been neglected in practice. Bertolini, Clercq and Kapoen offer an interesting framework for this integration: the concept of accessibility. In their model, tested in two cities in the Netherlands, they intend accessibility both as a dimension related to the qualities of the transportation system, such as travel speed, and the qualities of the land use system, such as functional densities and mixes. This concept can also be applied to economic and social goals, for example, access to employment, social networks, services, and to environmental goals.<sup>41</sup>

When thinking about cities that present high inequalities among their residents, especially in developing countries, it is of even more crucial importance to think about the social equity components of transportation. The challenges of a rapid urban growth and of coordinating land use with transportations assume are even greater than in the developed countries. Densities are higher and people, due to increased income and a need of mobility that is often not satisfied by the public system, are increasingly using cars.<sup>42</sup> The dwellers' quests for mobility are often not addressed by the authorities, due to a limited experience with urban planning, financing for transport and institutional shortcomings.<sup>43</sup> A lack of the necessary economic resources to build public transportation infrastructure and creating a shift in the planning of the city and in the delivery of services to the poorer sectors of the population complicates the framework. A commitment of the public authorities, the implementation of and dwellers' participation can

---

<sup>40</sup> Peter Cox, *Moving People*, 70.

<sup>41</sup> Bertolini, Luca, Frank le Clercq, and Loek Kapoen, "Sustainable accessibility: a conceptual framework to integrate transport and land use plan-making. Two test-applications in the Netherlands and a reflection on the way forward," *Transport Policy* 12 (3): 207.

<sup>42</sup> Robert Cervero, "Linking urban transport and land use in developing countries," *Journal of Transport and Land Use*, Volume 6 Number 1 (10 April 2013): 10.

<sup>43</sup> Cervero, "Linking urban transport and land use in developing countries," 19.

make this shift possible, as I will show in the next chapter, where I will illustrate the example of Curitiba. Despite the limits of the model, the approach of implementing integrated programs in the field of land use management and public transportation embraced by planners in Curitiba during the 1960s, proved successful. It is not always necessary to invest huge resources in order to have a more sustainable and inclusive city.

#### **1.4 My approach**

In my analysis, I focus on sustainable forms of surface transportation for passengers, with a focus on urban areas. My main interest concerns cities and the relation between transportation and social sustainability and inclusion. I do believe that the three main dimensions, environmental, economic and social, have to be respected in order to achieve sustainability. At the same time, though, my analytical approach focuses primarily on the dimension of social sustainability, because it is through this lens that I looked at the Curitiba case.

The planning of the city of Curitiba relies on a public transportation system based on buses. This is the reason why I decided to analyze only one of the forms of potentially sustainable public transportation, that is, rubber-tired vehicles, leaving unexplored other forms of transportation with low environmental impacts, such as steel-on-steel vehicles, streetcars, rapid transit and light rail transit.<sup>44</sup>

---

<sup>44</sup> Schiller, Bruun and Kenworthy, *An Introduction to Sustainable Transportation*, 314.

## **CHAPTER 2: CURITIBA, THE MODEL SUSTAINABLE CITY AND THE BRT.**

### **LITERATURE REVIEW AND FIELDWORK**

#### **2.1 The construction of Curitiba as a model sustainable city**

Curitiba is globally seen as a model sustainable city. It has received numerous prizes and other forms of recognition for integrated policies addressing land management, waste management, and its “Bus Rapid Transit” system. Around the world, and especially in South America, municipal governments look to Curitiba as a model of urban planning to emulate in order to concurrently promote environmental sustainability and social equity.

As sustainability became a more defined and important concept in public life and policy during the 1990s, many individuals and institutions—global and local—heaped compliments and awards on Curitiba as a beacon embodying the principles of sustainability. The city has been variously nicknamed as part of the branding process. Proponents call it “a model of efficient city planning”, “a model of environmental planning”, “the green capital of Brazil”, “the world’s greenest city” and the “ecological capital of the world.”<sup>45</sup> In 2010, it was even awarded with the “Global Sustainable City Award,” a prize given, in the previous year, to Stockholm, a city better known worldwide for its high standards of living, and high environmental standards. The jury motivation for granting this award summarizes the reasons this city has become famous internationally “the City of Curitiba shows maturity in their understanding of sustainable city development – both regarding policy and implementation. The holistic approach is well framed

---

<sup>45</sup> Macedo, “Curitiba,” 534.

and managed in order to create a strong and healthy community, integrating the environmental dimension with other dimensions like intellectual, cultural, economic and social." <sup>46</sup>

Curitiba's reputation at the international level as a model of "urban ecology" dates back to the 1990s, when planners and local politicians around the world started to consider it as an interesting case study to look at. In particular, the transportation system developed in the city from the 1970s has been effectively transferred to other cities in the Americas and throughout the world. This system is based on express buses that run on preferential lanes, and it is widely known as a Bus Rapid Transit, or BRT. I will talk more extensively on this transportation system in a later section of this chapter.

It is impossible to talk about Curitiba without citing Jaime Lerner, the individual who has been the main proponent of these programs reshaping Curitiba—the first director of the Institute for Research and Planning of Curitiba (IPPUC). It is impossible to avoid reading about him and what he did for the city, since he has been one of the main characters in its political life since the 1960s and since he is a worldwide renowned architect. During the 1960s he was a recent architecture graduate who, together with other young architects and planners, imagined a different kind of city. Not a city for cars, not a city with gigantic infrastructures (ideas so popular in Brazil at that time) but a place where its inhabitants would be happy to live in and would improve their quality of life. He would have later become mayor of the city for three mandates and governor of the state of Parana for two.<sup>47</sup> He has been Curitiba's greatest spokesperson, elevating it from a city little known outside of Brazil to a model and brand for sustainability around the world—with him as central personality of this narrative. He worked as a consultant for different public entities around the world and was the President of the International Union of

---

<sup>46</sup> "The Brazilian city Curitiba awarded the Globe Sustainable City Award 2010," Globe Sustainable City Award, accessed on March 20, 2015. <http://globeaward.org/winner-city-2010.html>

<sup>47</sup> De Oliveira, *Curitiba e o mito da cidade modelo*, 13.

Architects from 2002 to 2005.<sup>48</sup> These roles allowed him to go around the world and advertise Curitiba. Many criticize his approach and the fact that Curitiba's urban planning is associated with his persona, while other contributors of Curitiba's change were left in the shadow. The group of architects and planners that created the Curitiba model are, indeed, known as the Lerner group. On top of this the citizens' concerns were not taken properly into consideration.<sup>49</sup> At the same time, though, it is impossible to deny how it was thanks to him that the Curitiba model overcame the Brazilian borders.

Another main character in narrating the Curitiba successes was Jonas Rabinovitch, who in his article from 1992, was the first one to label Curitiba as an example of sustainable urban development outside of Brazil.<sup>50</sup> Rabinovitch had worked in the Institute of Urban Planning in Curitiba, as adviser of the mayor Jaime Lerner, he was the Director of International Relations for Curitiba municipality and later on started working for the United Nations. His name always appear when researching about the city and he can be considered one of the people that helped in making Curitiba such a famous model of urban planning around the world.

## **2.2 History of Curitiba and its planning**

The beginning of this story of Curitiba's planning roots goes back to the second half of the nineteenth century.<sup>51</sup> The first migrants that arrived in the area in that period were mainly from Poland, Italy, Germany, France and Ukraine, employed in cattle ranching, farming and the

---

<sup>48</sup> "Jaime Lerner," Jaime Lerner e Associados, accessed on January 20, 2015. <http://www.jaimelerner.com/bio-en.html>.

<sup>49</sup> Jeb Brugmann, *Welcome To The Urban Revolution: How Cities Are Changing The World* (New York: Bloomsbury Press, 2009), 221.

<sup>50</sup> Jonas Rabinovitch, "Curitiba: Towards Sustainable Urban Development," *Environment and Urbanization* 4, no. 2 (1992): 62.

<sup>51</sup> Joseli Macedo, "Planning a Sustainable City: The Making of Curitiba, Brazil," *Journal of Planning History* 12, no. 4 (November 2013): 337.

industries. The boom of migration happened because in that period private land property was instituted and new agrarian policies were implemented, leading to an economic expansion. In the following decades the area assumed further importance, especially after the port of Paranaguá was opened in 1885 (ninety kilometers East from Curitiba), making the city a strategic hub for trade. In those years more immigrants arrived in the city, also from Asia and the Arab countries, as well as from the rural areas of the Brazil.<sup>52</sup>

During the first half of the twentieth century, the population grew from fifty thousand to one hundred and eighty thousand, but then, in only a decade, it doubled.<sup>53</sup> From the '50s, Curitiba witnessed a massive rural migration from inside the state of Paraná and from other Brazilian regions. This rapid migration constituted a concern for the deterioration of the urban environment. By 1960, the population had already grown to more than three hundred sixty one thousand, and the high growth-rate went on for the entire decade.<sup>54</sup>

For this reason, in 1965, a public competition for the design of the new Master Plan was held. It foresaw the creation of an integrated public transportation and mixed-land use principles; the development of the industrial sector, with the establishment of a dedicated area for plants and services related to them inside the city; the improvement of the environment and the quality of life of the inhabitants; the division in zones dedicated to commerce and with residential purposes, located near the main nodes of transportation. The Master Plan took the place of the Agache Plan of 1943, aimed at restructuring the street networks, creating land-zones

---

<sup>52</sup> Macedo, "Curitiba," 538.

<sup>53</sup> Macedo, "Planning a Sustainable City," 335.

<sup>54</sup> Laura Tlaiye, *Successful Environmental Institutions: Lessons from Colombia and Curitiba, Brazil* (Washington, D.C: World Bank, Latin America Technical Dept., Environment Unit, 1994), 19.

and addressing sanitation problems, but it was based on a city of one hundred twenty thousand inhabitants.<sup>55</sup>

The creation of the *Cidade Industrial de Curitiba* (the Industrial City), an area not isolated, but integrated in the transportation system, with residential parts and basic services, as well as preservation areas, marked an important step for the economy and the growth of the city. The idea was to have an area with a large number of people available to work there and to avoid the creation of a sector that would have eventually become degraded and a ghost town. For this reason, it was located inside the municipality border.<sup>56</sup>

Migrants from the rural areas of the country, especially from the Paraná state, started to move to the Curitiba metropolitan area and because jobs were not available for them in the city, which was becoming too expensive, they had to settle down in informal settlements inside the city or more likely in the other twenty-five municipalities, both in formal and informal settlements. The migratory wave started in the 1950s, but it became more important in the 1970s, when the accelerate mechanization and modernization in the Brazilian countryside left hundreds of thousands of people with no jobs.<sup>57</sup> This constituted a new challenge for the planning and management of the city.

The challenges that Curitiba had to face were not new to the rapidly urbanized areas of Brazil. The city decided, though, not to base its planning around cars, but around an efficient and rapid (at least in the initial phases) public transportation system, and around an idea of space completely different than in other urban areas in the country. There were only two big cities in

---

<sup>55</sup> Macedo, "Planning a Sustainable City," 339.

<sup>56</sup> Clara Irazábal, "Urban Design, Planning, and the Politics of Development in Curitiba," In *Contemporary Urbanism In Brazil: Beyond Brasília*, edited by Rio, Vicente del Siembieda, William J., (Gainesville: University Press Of Florida, 2009), 203-204.

<sup>57</sup> Claudino Luiz Menezes, *Desenvolvimento Urbano E Meio Ambiente : A Experiência de Curitiba* (Campinas: Papirus Editora, 1996), 180.

Brazil that were based on sound planning principles, Brasilia and to a lesser extent Belo Horizonte. They were, though, designed around private means of transport and they were based on the idea that it was necessary to have great infrastructures, including a metro system, in order to compete with the metropolitan areas of the more developed countries.<sup>58</sup>

The principles of city planning that made Curitiba famous are the ones that started to be applied in the 1970s. In the first half of this decade, the recently created Institute of Research and Urban Planning (IPPUC), the municipal body in charge of coordinating and managing the implementation of the Master Plan, started putting in place the first famous projects, such as the initial phase of the BRT system, the preservation of the historical center, the creation of parks in the areas with native forests. From this moment on, Curitiba was portrayed as a city where buses work, streets are clean, public officers are nice and people go to the parks during week-ends.<sup>59</sup> In other words, it was described as a haven in a country whose cities were experiencing rapid and unplanned growth that led to disorganized mobility and social trauma, as well as to the mistreatment of the environment.

But none of the programs implemented were only aimed at protecting the environment. Even the creation of parks had actually the double target of preventing floods: the artificial lakes were created to prevent the cities from being constantly hit by flash-floods. So, how was the discourse about Curitiba being the “ecological capital” created? The first document that makes reference to a pattern in this sense is the special edition of the IPPUC’s journal “Memoria da Curitiba Urbana. Escola da Ecologia Urbana” from 1992.<sup>60</sup> In this publication, all the environmental efforts that the municipality made over the years were summarized and put in

---

<sup>58</sup> Harry Smith, and Jeremy Raemaekers, "Land use Pattern and Transport in Curitiba," *Land Use Policy* 15.3 (1998): 242.

<sup>59</sup> De Oliveira, *Curitiba e o mito da cidade modelo*, 20.

<sup>60</sup> Instituto de Pesquisa e Planejamento Urbano de Curitiba. “Memória da Curitiba Urbana. Escola Ecológica de Urbanismo.” *Revista do IPPUC*, Instituto de Planejamento e Pesquisa Urbana de Curitiba, 1992: 3-4.

order as if they were steps taken in a conscious way to protect the urban environment. Here, the municipality talks about a project of ecological urbanism that started 20 years before, in the 1970s, stating that idea of ecological urbanism has already started back then. The idea conveyed in this document is that the city was not only environmentally friendly, but also very dedicated to the environmental life conditions, to the human needs and to its citizens' well-being.

### **2.3 Bus Rapid Transit (BRT) systems**

The Institute for Transportation and Development Policy (ITDP), one of the leading non-governmental organizations working on sustainable transportation at the international level, defines the Bus Rapid Transit (BRT) as “a high-quality bus-based transit system that delivers fast, comfortable, and cost-effective services at metro-level capacities. It does this through the provision of dedicated lanes, with busways and iconic stations typically aligned to the center of the road, off-board fare collection, and fast and frequent operations.”<sup>61</sup>

BRT present characteristics similar to the ones of a light rail or metro system, and it is, therefore, more convenient and reliable than the usual bus systems, which are usually slower. Among the main features of a BRT are dedicated right-of-way to avoid congestion. “The dedicated lanes can be segregated and enforced in different ways and can have varying degrees of permeability”, meaning that they can be separated with the actual physical barriers or simply being lanes where private cars cannot pass. Another important element is the off-board fare collection. Passengers can pay or use pre-paid cards before entering the stations, which, being closed do not allow for people to enter without paying. This can reduce delays in significant

---

<sup>61</sup> “What is BRT?” Institute for Transportation & Development Policy, accessed on March 20, 2015. <https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/what-is-brt/>

ways. In addition, the waiting platforms, stations or tubes, as in Curitiba's case, are elevated at the same height of the buses, reducing passengers' boarding time. Some BRT systems present an additional important features, the intersection treatments. Examples of this are "increasing the green-signal time for the bus lane" or "forbidding turns across the bus lane and minimizing the number of traffic-signal phases."<sup>62</sup>

Latin America is the region of the world with the highest number of BRT projects already implemented or under construction. In the following image it is clear how the BRT is becoming a prominent transportation system in this region, especially in comparison with other continents, such as Asia, where the percentage of the population using the BRT on other form of transportation, either public or private, is way lower, considering the way higher numbers of city dwellers in Asian countries. In 2013, 156 cities around the globe were implementing some variation of the BRT system, most of them in South America and South-East Asia.<sup>63</sup> According to the BRT Data website, 31,608,958 passengers commute daily thanks to this kind of transportation.

---

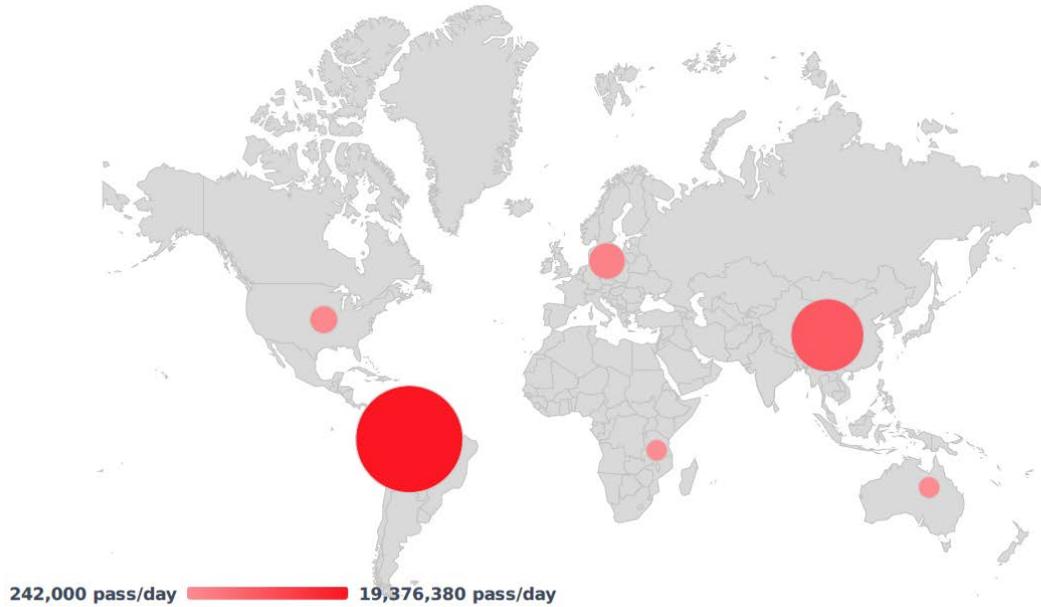
<sup>62</sup> "The Scorecard," Institute for Transportation & Development Policy, accessed on April 10, 2015. <https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/the-scorecard/>

<sup>63</sup> United Nations Human Settlements Program, "Planning and Design for Sustainable Urban Mobility. Global Report on Human Settlements 2013," UN-HABITAT: New York, 2014, 18.

Figure 1: BRT Panorama by Region

**🏠 PANORAMA PER REGION**

1. DAILY DEMAND PER REGION ADDS UP TO **31,608,958** PASSENGERS/DAY

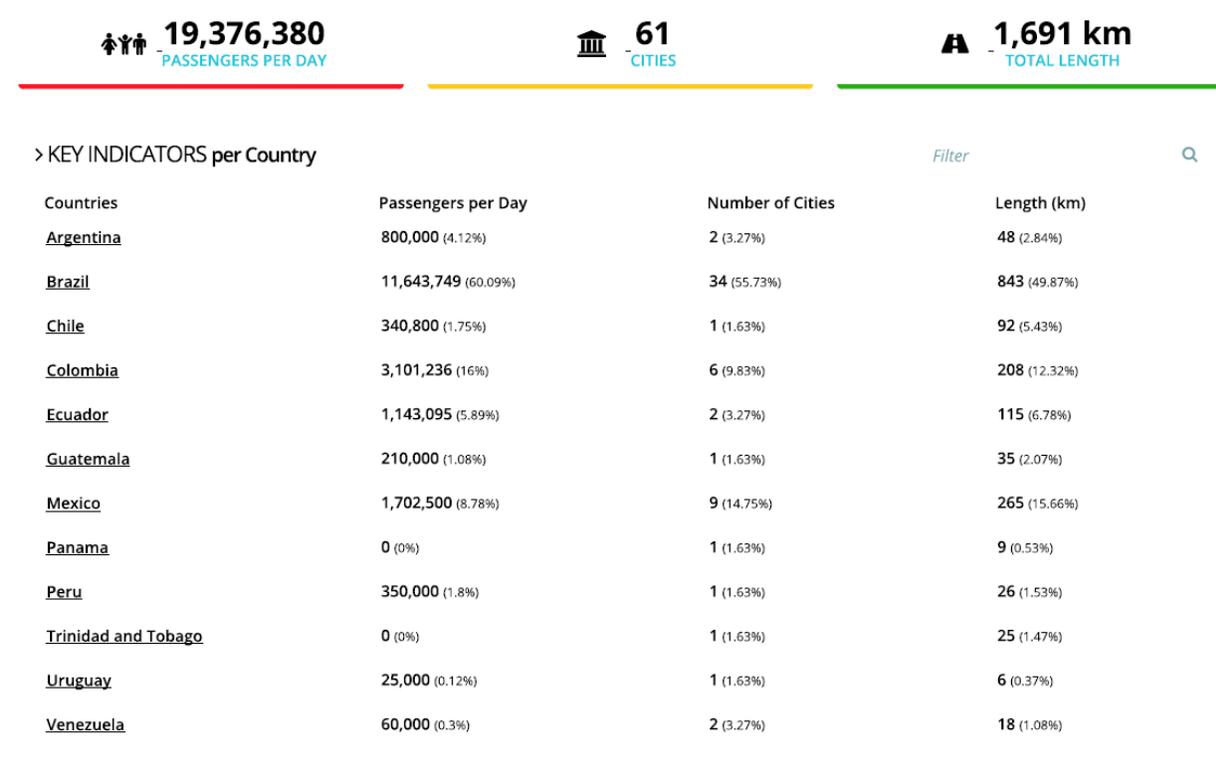


Region	Countries	Cities	Corridors	Passengers/Day	Length
<b>Latin America</b>	12	61	189	19,376,380	1,691 km
<b>Asia</b>	10	38	72	8,572,622	1,346 km
<b>Europe</b>	14	56	69	1,962,400	917 km
<b>Northern America</b>	2	26	43	1,025,515	862 km
<b>Oceania</b>	2	6	8	430,041	96 km
<b>Africa</b>	2	3	4	242,000	81 km

Source: "Panorama per Region," Global BRT Data, accessed on March 16, 2015. <http://brtdata.org/panorama/region>

As clearly visible from these data, most of the Latin American countries where the BRT is implemented are located in South America, with the exception of Guatemala, Mexico, Panama and Trinidad and Tobago.

Figure 2: Key BRT Indicators by Latin American Country



Source: "Latin America view. Key BRT Indicators per Country," Global BRT Data, accessed on March 16, 2015.  
[http://brtdata.org/location/latin\\_america](http://brtdata.org/location/latin_america)

Brazil is by far the country with the longest corridors (843 km), more cities with a BRT system (34) and number of passengers per day. In this case, we can affirm that the BRT

represents a successful example of technologic transfer from the Global South to the Global North.

### ***2.3.1 BRT in Curitiba***

The main feature that has made Curitiba so famous around the world is its Bus Rapid Transit, better known as BRT system. In this system, the stops are actually elevated platforms, in the shape of tubes. The passengers pay when they enter them, so that they can quickly get on the bus when it stops. In the same way they can easily get off the bus, since the doors open directly on the openings in the platform. Buses run in dedicated lanes, and their frequency is very high, during pick hours even every two minutes. Because of these characteristics, it is also called surface subway.

In Curitiba, the BRT was created in 1974 and it is only a part of the public transportation system, better now as *Rede Integrada de Transporte*, or Integrated Transportation Network. In the following map, it is possible to see how there are five main corridors, the ones in red, extending radially from the city center, where the express buses run on the preferential lanes, the actual BRT. Then there are several lines of buses (the lines in colors other than red), which run on concentric circles, or radially from the terminals (the black spots), connecting the BRT lines with the other parts of the city. This system is the result of a private-public partnership, since the buses are owned and run by private companies, but the entire system is managed by URBS, *Urbanização de Curitiba*, a semi-municipal entity<sup>64</sup>.

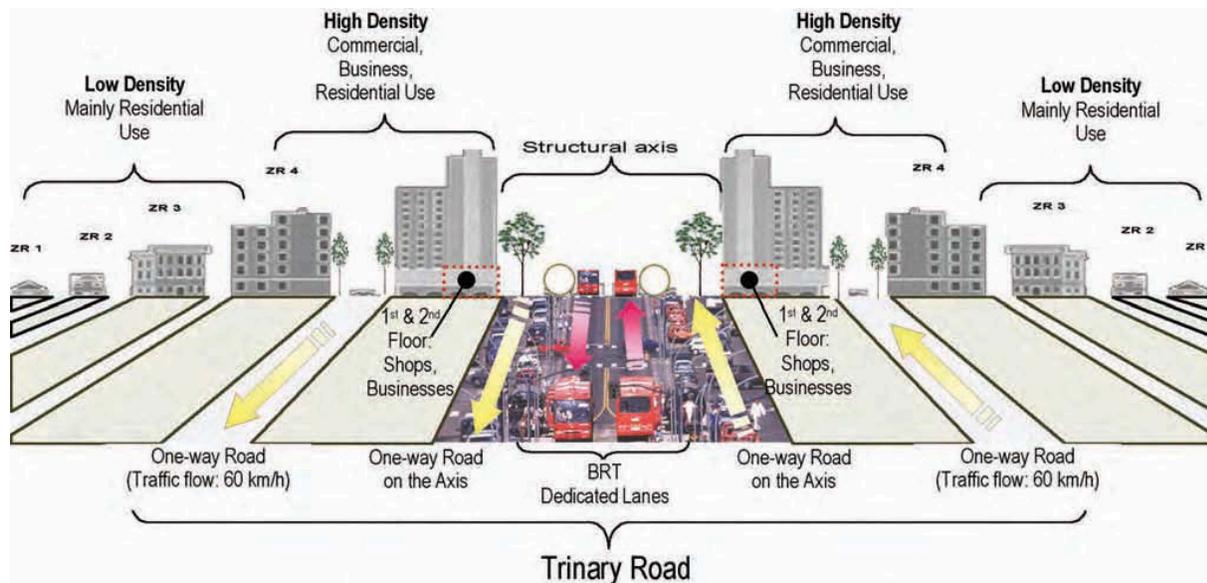
---

<sup>64</sup> Urbanização de Curitiba, accessed on April 12, 2015. <http://www.urbs.curitiba.pr.gov.br/>



The bus system is integrated with zoning and housing plans. Along these transportation corridors, new development must be multi-story buildings, with residential, commercial and business purposes. The furthest you go from these five corridors, the shortest the buildings become. The idea is that the density should be higher closer to where the express buses run and it should decrease as the buses lines and bus stops become less frequent. All the areas of the city, should be well served by the system and using car should not be as necessary. Another main feature of the zoning and land use approach in Curitiba, is that in every zone there are development with different uses and standards. In the same zone there can be high-income and lower-income residential building, commercial and industrial areas, publicly owned lots for schools, hospitals and so on. In this way, incomes, ages and people with different backgrounds are mixed, something that should prevent segregation.

Figure 4: Trinary Road structure in Curitiba.



Source: World Bank. *Eco2 Cities. Ecological Cities as Economic Cities*. Washington, D.C. : World Bank, 2010), 171.

## 2.4 Findings of my interviews

Regarding the main topic of my research, which is, the public transportation system and resident mobility in general, the contrasting information I found before going to Curitiba were confirmed by my direct observation and the answers I received during the interviews and informal conversations. While Curitiba has a very high share of its population using the bus system every day, since the year 2000 it also has the highest number of cars per capita among the Brazilian state capitals after Brasilia.<sup>65</sup> This means that, even if the transportation system is considered to be enough for certain commuting and for the shares of population that can't afford to use the car every day to go to work—considering how fuel and especially parking are expensive - it is not able to address every need. All the neighborhoods are accessible by bus, but some are more and some less, and not all needs are met. Many interviewees are well aware of this contradiction between the idea of the success of the public transport and the high percentage of people owning and commuting by car.

The areas best served by the BRT transportation system are the ones along its main corridors or axes, which are the ones where the express buses run. The waiting time is lower, with buses usually on time, cleaner and crowded only during rush hours. The apartment buildings located along the main corridors in the North and West branches are very costly, and only middle and high-income families can afford to live there. Along and close to the South corridors the houses are cheaper, but, contrary to the whole logic of integrating the BRT system with the zoning and the housing sectorial plan, foreseen in the 2004 Master Plan, only few residential developments were built there. The result is that the density is way lower and the system is not used at its full capacity.

---

<sup>65</sup> Moore, *Alternative Routes to the Sustainable City*, 153.

In Curitiba, deciding to give up using the car, or to drastically reduce its use, can be a brave choice if you do not live in the best served zones. The distances are too big to walk around the city, the bus system does not serve all the areas capillary – and this does not only include the peripheral and poorer areas, but also some of the middle-high income ones. There are few bike lanes, not well maintained and in general not safe enough. More and more *Curitibanos* are starting to use the bike as a means to commute, but there are not enough bike lanes, biking is, in general, not very safe due to the fast traffic and bikes can't be transported on the bus or stored safely close to the terminals.

Another issue that concerned most of the interviewees is the lack of *temporal integration* of buses. Until when I was there in August, only spatial integration existed. This means that people needing to change buses had to pay for two or more tickets, depending on how many buses they should take, unless they were managing to change line at the terminals or in the tube stations. In these places they were not requested to pay again when getting on another bus. This actually means that people tend to travel longer in order to reach the closest terminal, instead of changing bus at the most convenient stop, to avoid paying again. This, of course, is mainly a problem for people with lower economic resources. This problem has been discussed for long and URBS is trying to change it, introducing a digital card that should correct the issue and introducing the temporal integration.

Another main concern of the population regards the way the bus system is governed. Some of my informants were dissatisfied with the way URBS manages its relations with the private companies that own the buses. Apparently, these companies belong to dominant business families, who do not have in mind the most efficient functioning of the system, but are aiming at maximizing their companies' profits. They have been accused of corruption and they have been

called, during the interviews, the “bus mafia.” For them, it is not convenient to add more buses during rush hours or to keep them cleaner and safer, since their contracts have been renovated over the years without any serious renegotiation. This public-private system could be a good solution to manage the bus system, but the terms of the contracts should be changed, so that it would be the municipality to dictate the rules, thinking about the improvement of the system and the satisfaction of the customers. People complained that the conditions regulating the relationship between the URBS and these private companies, paid by public money, are not transparent and are negotiated behind closed door, without any citizens’ participation.

The challenges facing future governance of Curitiba’s extend beyond the transportation system. The city is growing at an incredible rate, largely because of immigration from the rural area that was not correctly foreseen. The lack of affordable housing in the city is causing the movement of population outside of the city borders and the flourishing of informal settlements inside and outside the municipality. These latter ones are not as vast or visible as the more famous *favelas* in Rio and in Sao Paulo, but they are often located along the polluted rivers that cross the city. They are a treat for the health of their inhabitants, and, as often happened, they are frequently hit by flash floods that destroy their houses and their personal belongings. The municipality is moving forward in this direction. The COHAB<sup>66</sup> is the entity in charge of giving people property titles over the land and the houses they live in, as well as relocating people to areas that are safer and healthier, preferably not far from their communities, according to the words of an officer working for them. As other voices say, though, the municipality does not do enough and it often times divide communities and relocate people far from their original neighborhood.

---

<sup>66</sup> *Companhia de Habitação Popular de Curitiba*, that is, Popular Housing Company of Curitiba. It is a mixed economy entity in charge of executing the housing policies in the city and, partially, in the metropolitan region.

A further concern of the *Curitibanos* is the loss of public safety that has occurred in the last years. Previously known for being a safe haven in Brazil, it is now considered one of its most violent cities. The threat of violence is one of the motivation that push people to retreat in such closed communities. To mention one data, in 2011 Curitiba was at the thirty-ninth place in the list of cities of the world with the highest rate of homicides per capita. São Paulo and Rio de Janeiro, instead, do not appear among the first fifty ones<sup>67</sup>. This is an important point of analysis not for the fear in itself, but for the fact that this has changed the perspective of Curitiba's inhabitants about their city and their perception of space and ideas of mobility, causing material changes. After dark, they tend not to use the public transportation system or to just walk to reach their final destination. For personal observations, I can say that the same can be said about festive days, when you cannot see many pedestrian in the streets. With commercial activities and offices shut down, people are afraid to walk around. And this is not only true in the downtown area, well-known for not being particularly safe, but also in the neighborhoods around it, supposedly less hit by crime. Taxis, managed by the URBS as well, are safe but very few, on top of being too expensive for the majority of population. People then decide to rely more on cars.

All of this is linked to a wider discourse about social exclusion of the lower income sectors of population. There have always been enclosed condominiums in the city, but more recently gated communities started to flourish<sup>68</sup>. These are not as common as in other metropolises of Latin America, and, from my observation, they are not as guarded or secluded from neighboring communities. But they have nevertheless created more segregation in a city that praised itself as an example of socio-economically integration. The proliferation of gated

---

<sup>67</sup> <https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/what-is-brt/>. This list of the most dangerous cities in world by number of homicides per capita, was compiled by the Mexican think thank "Citizen' Council for Public Security and Criminal Justice," based on the available data for 2011.

<sup>68</sup> Irazábal, *City Making and Urban Governance in the Americas*, 190.

communities denotes the fact that the city is not the safe community that has been advertised, and shows how the city is actually highly divided and fragmented, with enclaves surrounded by walls and gates that are not accessible to all *Curitibanos*. This goes against the principles of openness and free circulation that accompanies the idea of a modern city,<sup>69</sup> and, more specifically, the idea of Curitiba as a sustainable, inclusive city.

## **2.5 Scholars' critiques to the Curitiba model**

Some voices coming from Brazilian academia, especially from the Federal University of Paraná (UFPR) - the main public university in Curitiba and the oldest university in Brazil - started raising some critiques against the idea of Curitiba being a model planned city and an example of sustainability. They state that the image of Curitiba as a model city was the result of a marketing operation, carried on by the municipality and other municipal public bodies, with Jaime Lerner, former mayor of the city, as one of the main characters of this narrative. The main proponent of this ideas are Marcio de Oliveira, Dennison De Oliveira and Fernanda Ester Sánchez Garcia, all working at the UFPR.

What de Oliveira states in his article is that it was not the narrative that guide the practice, but the contrary. There was not a conscious and shared plan to build Curitiba in the way it became later. The 1990s Curitiba was the result of a series of uncoordinated well-thought different initiatives and programs, programs that were partially green, but the final result was unexpected<sup>70</sup>.

---

<sup>69</sup> Clara Irazábal, "Localizing Urban Design Traditions: Gated and Edge Cities in Curitiba," *Journal of Urban Design* 11, no. 1 (February 2006): 77.

<sup>70</sup> Márcio de Oliveira, "A Trajetória do Discurso Ambiental em Curitiba (1960-2000)," *Revista de Sociologia E Política*, no. 16 (June 2001): 105.

In his book “Curitiba e o Mito da Cidade Modelo”, Dennison De Oliveira affirms that the success of Curitiba’s planning model is not to be ascribed to smarter technical solutions that were implemented there. Other cities in Brazil were, at the time, trying to identify alternative planning solutions, and they had good plans. But they were not capable to implement these plans and transform them in efficient projects on the ground, leaving them on paper<sup>71</sup>. What made a difference in Curitiba were its political and economic conditions, as well as the connections between the planners and the economic elites. The city was undergoing a sustained growth, while, at the same time, did not experience a high political turn-over that other cities experienced. This is the reason why the Master Plan could be implemented so quickly and without finding major oppositions, since it was meeting, at the same time, the desires of the political class and the needs of businesses.<sup>72</sup>

According to Sánchez García, Curitiba was an experiment of urban planning, in a Brazil under a dictatorship and that wanted to be seen abroad, as more modern. The city passed from being an example for Brazil in the 1970s, to be a multimedia spectacle in the 1990s, whose audience was not the local inhabitants anymore, but the rest of the world. All the new programs and actions were transformed in products of consumption, with no attention left to the environment, which was, supposedly, the real reasons why certain plans and programs were implemented.<sup>73</sup> Every time that the municipality, and especially Lerner, were about to launch a new program, they were planning very carefully its advertisement.<sup>74</sup>

Many of the people I interviewed while in Curitiba, referred to this idea that sees the popularity of Curitiba around Brazil and the world as the result of a marketing operation carried

---

<sup>71</sup> De Oliveira, *Curitiba e o mito da cidade modelo*, 77.

<sup>72</sup> De Oliveira, *Curitiba e o mito da cidade modelo*, 131.

<sup>73</sup> Fernanda Ester Sánchez García, *Cidade espetáculo: política, planejamento e city marketing* (Curitiba: Editora Palavra, 1997), 42.

<sup>74</sup> Sánchez García, *Cidade espetáculo*, 58.

on by the municipality, especially the mayors and the Institute of Research and Urban Planning (IPPUC), together with some international organizations. They were often bringing up this argument without me asking about it, showing that this idea has been circulating among the common citizens.

## **2.6 Future challenges and developments**

The year 2014 was of extreme importance for deciding the next development of the city of Curitiba. The Master Plan is under revision and, subsequently, all the sectorial plans – the ones for housing and public transport among them – will undergo major changes. The IPPUC and the Municipality held a series of meetings and public hearings, involving private citizens, civil society organizations, grass-roots movements and whomever else was interested in redesigning the city. During these events, people listened to public agencies' proposals for the development of the city, can ask questions, and can express their concerns and opinions.

I attended some of these meetings. The municipality made an effort to develop participatory tools for its population to be an active part in the process of creating a new, more innovative, sustainable and inclusive Curitiba. I observed though, and it was conformed in some of the interviews I conducted, that *Curitibanos* are not satisfied by the way the process of revision of the master plan has been conducted so far, since they still think that their voices remain, most of the time, unheard. It will be interesting to monitor how this process will go forward and to analyze if the concerns and the ideas of the population will have been taken into consideration by the city officers and planners. Unfortunately, the revised master plan was supposed to be released at the beginning of 2015, but in May 2015 this has not happened yet.

One of the main decisions that will be taken during the next year will regard the construction of the first metro line. It will run on a north-south axis, underneath one of the main roads in the city, and it will be integrated with the existing bus system, making it one of the busiest corridors. Construction should start in the next year and be completed in 2020. This decision will represent a step back from the original approach the municipality embraced when they invented the BRT. In my interviews and in my informal conversations with academics and public officers, as well with the common users of the bus system, many people shared their concerns about this. Why not simply improve the way the express buses work? Why spend so much money on a metro line when its cost is so much higher? URBS should increase the fleet, especially the hybrid and biodiesel buses, implement the temporal integration all over the city (and hopefully, the metropolitan area) and introducing the preferential traffic lights. In this way the current infrastructures could be used at their full potential and the system will remain cheap and sustainable. The resources could be used to fix the problems of lack of housing and basic services in the peripheral areas of the city and in the informal settlements, as well as on the social, health and educational programs, as some of the interviewers proposed.

## CHAPTER 3: CASE STUDIES AND POLICY RECOMMENDATIONS

### 3.1 Case studies

Two of the most prominent examples of successful implementation of a BRT system are the *Transmilenio* in Bogotá, Colombia and the *Transantiago* in Santiago del Chile. While the first one is widely known, and it has been internationally promoted as a model for the cities in developing countries, the bus system in Santiago is fairly new and it has not so far received the same kind of attention. In the following two sections of this third chapter I will show what are the traits that made them famous and I will illustrate some of the critiques that have been moved towards these two systems.

#### 3.1.1 The *Transmilenio* system in Bogotá, Colombia

Bogotá's most recent innovations in the field of urban planning and public transportation transformed it from a city highly criticized for its poor quality of life to an international example of best practice. From being one of the most violent cities, with high traffic rates and very limited green spaces, it became famous around the world for how quickly its mobility modes changed and how the benefits of this renovation were spread to all the sectors of its population. The most prominent feature of this renovation project is the *Transmilenio* bus system that was built all around the city. This bus system has been praised for being one of the most important in the world and its fame is partially due to the fact that the team that helped construct it travelled the world to explain its functioning to other governments.<sup>75</sup>

---

<sup>75</sup> Gómez, Jairo. *Transmilenio: La Joya de Bogotá*, (Bogotá: Transmilenio SA, 2003), 77.

The *Transmilenio* started to be constructed in 2000, following the example of the BRT system of Curitiba. Before this new bus system was established, the city of Bogotá suffered from a lack of an efficient, when existing, public transportation system, over which people preferred to use the car. This new system was meant to address a series of severe transit and traffic-related issues. The drivers were dangerously rushing from stop to stop because they were paid according to the number of passengers transported. On top of this, the buses were highly polluting and delays at stop were frequent due to the fact that every passenger had to hand the money over to the drivers,<sup>76</sup> not to mention that criminal groups owned many of the bus companies.<sup>77</sup> On top of this, social and spatial segregation within the city was by the 1990s a prominent trait of the city and there was a need to change the dynamics of exclusion of the residents of the peripheries.<sup>78</sup>

The BRT, and the entire network of feeder buses linked to it and reaching the high-density peripheries, seemed like the perfect mode of transport for a city like that. It would have allowed to have a public transportation system that could cover the entire city, even the neighborhoods usually lacking of services, in a short period of time and with a little investment. The streets and roads to build the BRT were already in place, it was only necessary to close them to the chaotic traffic that was taking over the streets. The planning challenge in Bogotá was related to the fact that, contrary to Curitiba, the city was already extremely spread out and millions people were living in it. Therefore it could not be planned from scratch but the BRT, as well as the other projects, needed to adapt to a fully built environment.<sup>79</sup>

---

<sup>76</sup> Fred Moavenzadeh and Michael J. Markow, *Moving Millions. Transport Strategies for Sustainable Development in Megacities* (Dordrecht, the Netherlands: Springer, 2007), 175.

<sup>77</sup> Thomas E. Bassett, and Andrea Marpillero-Colomina, "Sustaining Mobility: Bus Rapid Transit and the Role of Local Politics in Bogotá," *Latin American Perspectives* 40, no. 2 (March 2013): 139.

<sup>78</sup> Alice Gil-Beuf, *Ville Durable et Transport Collectif: le Transmilenio à Bogotá*. *Annales de géographie* no. 5 (2007): 535.

<sup>79</sup> Gil-Beuf, *Ville Durable et Transport Collectif*, 536.

Another successful project linked to a more sustainable form of mobility was the impressive bike path network. The so-called *CicloRuta* that started construction in 1996, and spread throughout most of the city. Its establishment was accompanied by a campaign to foster the use of bicycles. This network is connected to the BRT system and safe storage is available at the main stations. This means of transportation was the only private one available to *Bogotanos* with low income living in the peripheries. Before, biking through traffic was, though, dangerous and inconvenient. *Cicloruta* has been praised for being one of the most comprehensive cycling systems in the world, it helped, together with the increased use of the bus system, in diminishing traffic and pollution, increasing the city's air quality.<sup>80</sup>

The administration did not focus merely on mobility. It undertook a major plan of urban revitalization aimed at “constructing equality”, in the words of Enrique Peñalosa, mayor of the city from 1998 to 2001, and probably the most prominent character in the transformation of Bogotá,<sup>81</sup> with a similar role as Lerner's in Curitiba. The district development plan for the period 1998-2000 was called “*Por la Bogotá que Queremos*” (For the Bogotá We Want) and it prioritized public space and transport. The mayor made sure that the *Bogotanos* were made aware of the projects the municipality wanted to undergo and that it would have actively participated in the decision process.<sup>82</sup>

Around half of the city had sprung up informally, often on the erosion-prone sides of the hills that surround the city. These areas usually do not benefit from the provision of a public transportation system and services more in general. The administration then “created a municipal

---

<sup>80</sup> “Bogotá's CicloRuta is One of the Most Comprehensive Cycling Systems in the World,” C40 Cities, accessed April 12, 2015. [http://www.c40.org/case\\_studies/bogotá's-cicloruta-is-one-of-the-most-comprehensive-cycling-systems-in-the-world](http://www.c40.org/case_studies/bogotá's-cicloruta-is-one-of-the-most-comprehensive-cycling-systems-in-the-world)

<sup>81</sup> Enrique Peñalosa, "A City Talks: Learning from Bogotá's Revitalisation." *Architectural Design* 81.3 (2011): 90.

<sup>82</sup> Bassett, and Marpillero-Colomina, "Sustaining Mobility," 137.

land bank company which bought up land that was either sold voluntarily or through the use of compulsory purchase orders. The company, *Metrovivienda*, produced quality urbanism and private developers built and sold homes within set price and time constraints.”<sup>83</sup>

In Peñalosa discourse, a main point revolves around people’s need for happiness. In his view, cities’ residents need beauty, need to walk, be around people and nature and, most of all, they need not be excluded and have to feel a sort of equality. The tendency in the cities around the world has been to privatize the public space, which has been disregarded and degraded, diminishing the opportunities for residents to have access to them. That is why he decided to build parks, pedestrian ways, squares and bike paths, on top of a network of libraries, schools and day-care centers.<sup>84</sup>

Many critiques have been moved towards the *Transmilenio* and Peñalosa’s administration have been criticized for various reasons. First of all, the long-term sustainability of this mode of transportation in Bogotá has been questioned. The properties around the BRT system have raised in value, making it challenging for small-scale vendors to set up shops, as well as for potential home renters and buyers with lower income to settle in these areas of the city. This is a set back from Peñalosa plan to have the poor being the main beneficiaries of the new system.<sup>85</sup> While the bus system has become more affordable, the property has not and people, in many cases, had to move further from the areas where they work, a similar critique to the one moved towards Lerner.

---

<sup>83</sup> Peñalosa, "A City Talks," 91.

<sup>84</sup> Charles Montgomery, *Happy City: Transforming Our Lives Through Urban Design*. (New York: Farrar, Straus and Giroux, 2013), 7-8.

<sup>85</sup> Bassett, and Marpillero-Colomina, "Sustaining Mobility," 140.

Others sources though, say that, despite the fact that lower income sectors of the population have to travel more to reach their workplace, the population density in the city of Bogotá has overall increased, while the sprawl has diminished, meaning that the purpose of the bus system to decrease the overall commuting time has worked. In other words, the overall mobility has improved but it has not benefited everybody in the same way.<sup>86</sup>

In conclusion, the material and environmental changes in Bogotá are undeniable. The administration's purpose was not only to change the infrastructures and the public transportation system. It was also to change the attitude of the *Bogotanos* towards using the bus system, usually seen as a means of transportation for the poor, towards the public space in general and to make it a safer and more enjoyable city for everybody. They were successful in doing so in the span of a decade and this achievement should be recognized, despite the critique moved to the *Transmilenio*.

### **3.1.2 The *Transantiago* system in Santiago del Chile.**

The BRT system built in Chile's capital Santiago has not received the same kind of attention than other systems around the world and it is rarely cited as a good practice. This does not mean that it is not an example to follow. On top of a not-so-successful early stage of implementation, I ascribe this to the fact that the project implementation is fairly new and to the fact that no massive communication strategy has been put in place by the municipality or international organizations.

---

<sup>86</sup> Juan Pablo Bocarejo, Ingrid Portilla, and Maria Angélica Pérez, "Impact of Transmilenio on Density, Land Use, and Land Value in Bogotá," *Research in Transportation Economics* 40, no. 1 (April 2013): 84-85.

The city of Santiago was experiencing, at the end of the '90s, the same problems as many cities in South America and in the Global South. The municipality could not rely on an endless budget, the population was growing and the city sprawling. Congestion was a problem as car usage increased. Contrary to other cities, though, it could count, since the 1970s, on a metro system that was considered very efficient, but was underutilized and with a high percentage of users that needed to pay an extra fare to reach the metro stations, by bus or by shared taxi.<sup>87</sup> To overcome the problems related to an uncoordinated transportation system where the shared taxis, the different bus companies and the metro system were not interconnected, the city of Santiago looked at the two examples of Bogotá's and Curitiba's BRT system. When the BRT project was first implemented in 2007, it aimed explicitly at being environmentally, socially and economically sustainable.<sup>88</sup> It is now considered by some as "the most ambitious transport modernization plan implemented in the last decade in a large developing city."<sup>89</sup>

After the first phase of implementation, though, the project encountered harsh criticism. The project was launched very quickly, at a moment when most of the infrastructures and operating conditions to make it function properly did not exist, and when the fleet of available busses was too small. The result was a chaotic situation<sup>90</sup>. A contingency plan was then launched in order to increase the service quality, with a package of measures including the construction of new infrastructures, such as busways and interchange facilities<sup>91</sup>. In more recent works,

*Trasantiago* is seen as a model to look at, even if it still has a long way to become a sustainable

---

<sup>87</sup> María Francisca Yáñez, Patricio Mansilla, and Juan de Dios Ortúzar, "The Santiago Panel: Measuring the Effects of Implementing Transantiago," *Transportation* 37, no. 1 (August 26, 2009): 128.

<sup>88</sup> Juan Carlos Muñoz, and Antonio Gschwender, "Transantiago: A Tale of Two Cities," *Research in Transportation Economics* 22, no. 1 (January 2008): 46.

<sup>89</sup> Dario Hidalgo and Aileen Carrigan., "BRT in Latin America High Capacity and Performance, Rapid Implementation and Low Cost," *Built Environment* 36, no. 3 (October 13, 2010): 291.

<sup>90</sup> Juan Carlos Muñoz, Marco Batarce, and Dario Hidalgo, "Transantiago, Five Years after Its Launch," *Research in Transportation Economics* 48 (December 2014): 184.

<sup>91</sup> Hidalgo, and Carrigan, "BRT in Latin America High Capacity and Performance, Rapid Implementation and Low Cost," 292.

and efficient system. Some of its achievements regard the fact that the bus system has been formalized, the accidents diminished, the bus-based pollution and noise decreased.<sup>92</sup>

An important additional aspect of the project was that cash transactions on the bus were eliminated from the beginning, thanks to the introduction of a smart card through which the fare could be paid by all users. This was intended, on top of eradicating the possibilities of assault, to allow for temporal integration, allowing people to pay only one fare and using different modes of transportation more cheaply and easily.<sup>93</sup> The ridership on the metro system doubled thanks to this integration, without a decreased quality of the service.<sup>94</sup>

### **3.2 Policy recommendations**

In the following section, I will outline some policy recommendations for implementing a sustainable and efficient, as well as economically-sound, public transportation system, based on analyses of the BRT networks of Curitiba, Bogotá and Santiago. These recommendations are meant for public bodies responsible for planning and managing urban transportation and land management, whether municipalities or other public bodies. This document is directed especially at cities and metropolitan areas that have small, less stable budgets, and which must, therefore, carry out careful cost-benefit analyses. These recommendations do not only address public transportation itself, but issues of sustainable mobility and social sustainability.

My main recommendation is that Bus Rapid Transit systems should be seen as a viable and priority consideration among public means of transportation. This form of transportation universally boasts measured positive outcomes for the environment—in terms of reduced

---

<sup>92</sup> Muñoz, Batarce, and Hidalgo, “Transantiago, Five Years after Its Launch,” 184-185.

<sup>93</sup> Muñoz and Gschwender, “Transantiago: A Tale of Two Cities,” 47.

<sup>94</sup> Muñoz, Batarce, and Hidalgo, “Transantiago, Five Years after Its Launch,” 185.

congestion and pollution—as well as for the daily lives of city residents, especially lower income individuals—by promoting greater access to public health, inclusion in a wider number of public spaces and social activities generally associated with exclusivity for the wealthy.

- *Introduce a Bus Rapid Transit system.* BRT can be built in a shorter time and with lower resources than a metro system. It is more efficient and fast than a normal bus system and less polluting than cars. The policies and projects in the transportation sector should be integrated into the land management, with the BRT running in the areas with higher densities. The entire system should not be based on the BRT: areas with lower population densities can be served by the feeder buses, in an integrated system.
- *Regulate the estate market* in order to prevent a steep increase in price of properties along the BRT lines, trying to mix incomes and keep property costs down. In this way, spatial segregation does not become a side-effect of the BRT.
- *Implementation of measures to discourage the use of cars, and promotion the use of public transportation.* Among these measures, parking can be made more expensive and some streets can be closed to traffic. In order to push people not accustomed to walking and unfamiliar with using a bike, accommodation can be gradually promoted through temporary measures such as closing streets to traffic during holidays and on Sundays. The positive consequences of such projects are in terms of reduced congestion and pollution and health benefits.
- *Use forms of public-private financing and management.* Many municipalities do not have the financial capacity to buy entire bus fleets and the organizational capacity to manage

the entire system. For this reason, it is advisable for the municipalities to partnering with private enterprises.

- *Use of smart cards to pay fares.* Paying with smart cards allows for transactions to be cash free, making the boarding on the bus faster, and diminishing the chances of petty thefts and assaults within the system. In addition, they facilitate analysis of departures and arrivals, showing where people board and where they disembark at the end of their trip, allowing managers to periodically modify the system to conform to user habits. This system was used on the *Transantiago* buses since its inception, not so in Curitiba. The *Urbanização de Curitiba* started the experimental use of the smart card since August 2014, making travels more convenient and faster for the bus system users.
- *Building and keeping systems that are flexible.* Cities change constantly. A public transportation system needs to be flexible and adapt to users' needs. It cannot always stick to the initial plan. In this sense, the BRT is more adaptable than other kinds of transportation that require infrastructures involving large up-front investments of capital and time, such as a metro. Cities of the Global South, like Curitiba, keep on changing and expanding, with many people moving there following unforeseeable patterns. New areas of the city that were not previously inhabited witness the creation of new work and residential areas. This requires for the expansion of the public transportation system in a short period of time and with limited resources to do so. In this case, building a metro system is not the best and more suitable solution to implement.
- *Building reliable, widespread, and safe networks of dedicated bike lanes, connected to the public transportation system.* In many cities it is necessary, first, to build a bike culture that might not be existing. Biking can be seen as a recreational activity, but not as

a way of commuting in everyday life. The obstacles to using bikes that the city residents might encounter are various, both cultural and material. Many cyclists do not feel safe commuting on roads without dedicated lanes because they are vulnerable in regular traffic. This is why dedicated lanes should be built. In Curitiba, the habit of using the bike to commute is not very widespread. People still consider biking as a leisure activity or a sport, while they do not feel comfortable in riding to work. The main reasons are the lack of safety for cyclists in the streets and the fact that it does not seem a suitable means of transport for daily commute, since the working clothes could get dirty or get creased. In this regard, Bogotá represents a good example to look at. Previously, in the Colombian capital, not many people used bikes on a daily basis. At first, the municipality stimulated the use of bikes during the week-end, then it built new bike lanes around the city, connecting them with the bus transportation system and offering safe storage for bikes. In this way it slowly incorporated a bike culture in the residents habits and it made it convenient and safe for them to use this means of transportation, incentivizing at the same time the use of the public bus system.

- *Creating a walkable city.* On top of having pedestrian streets and streets that can be closed to private automobiles during holidays, it is necessary to foster a culture of urban outdoor activity, in such areas as parks that are safe and accessible to all—across the city, rather than only in its central areas. Bogotá is again a good example of incentivizing people to leave at home their cars and embrace alternative and more sustainable mobility modes.
- *Creating collaboration and coordination between municipalities.* It is necessary to look not only at the peripheries but at the metropolitan areas as well. As cities expand and

many more people are abandoning the rural areas, cities are expanding beyond their usual borders. Many times the municipalities act without coordination and collaboration, with the result that the ones with a lower budget cannot implement substantial projects. Often, though, people living in these sectors need to move to other areas in order to work or to use the services unavailable where they live. Since they have fewer resources, it is plausible to think that they are less likely to own or have the opportunity to use a car and they should rely more on the public transportation systems and services more in general. In this regard, the municipality of Curitiba has not done enough in order to consider the needs of the thousands of people living in the surrounding municipalities that commute everyday to go to school and to work in the city. This will not be possible until a new public planning body in charge of taking and implementing decisions at the metropolitan level will be created.

- *Promoting public participation in the planning process and during the implementation phase.* Most city administrators and politicians are more familiar with planning conventions that do not correspond to the needs and desires of city residents. They typically look at a city as an entity in its entirety, while little attention is given to the peculiarities and aspirations of the different groups and neighborhoods that constitute it. It is important to promote the participation of city residents in every phase of projects aimed at modifying the public space, from the design to the implementation and evaluation. The municipality of Curitiba and various other public and not-for-profit organizations, as well as grassroots movements, have organized public hearings and discussions in order to include the residents' considerations, critiques and doubts in the design of the new master plan and the sectorial plan. The challenge will be to include the

residents in the following phases and to implement a mechanism of monitoring and exchange of information open to all the people living in Curitiba.

## CONCLUSIONS

Curitiba has been considered a model sustainable city for decades. Many cities in southern Brazil and South America look at it as an aspirational example for its high quality of life and environment-friendly policies and programs. The BRT system has been implemented in many cities around the world and the Curitiba's model of land management has been praised as a case study to look at by planners and local politicians, as well as by international organizations. Despite its fame at the international level, some voices started to criticize this model. Some of the comments can be read as the usual critiques of residents of a city and users of the bus system that are not satisfied with the services offered by their municipality. Some criticize the approach that the team of administrators and planners used in order to get things done, without a real consultation with the *Curitibanos* and they complain that many residents cannot fully access to the services offered, the BRT being one of them. Some think that the innovative policies and programs are not innovative and creative anymore and that the city stopped trying to really offer a better mobility, and a better quality of life, to its citizens.

My findings made me realize that the image of Curitiba portrayed outside of Brazil misrepresents reality. The marketing operation to advertise it around the world as a sustainable, cost-efficient, socially inclusive and man-centered city has been very successful and this image is still alive today. Curitiba seen from the *Curitibanos'* perspective, though, is a different story. It is still a place where people are proud to live in, that offers more opportunity to its citizens in terms of housing, social and cultural programs compared to other metropolis in Brazil, where people can still rely on the public system to commute. On the other hand though, it had to face the same challenges that other rapidly-urbanizing cities do: population boom, increasing socio-economic

segregation, lack of public safety. The innovative, creative, inclusive and cost-effective solutions in the field of urban planning that made it so famous, did not come up as fast as they should have in the last two decades, in order to efficiently respond to these new challenges.

I still believe that Curitiba can offer efficient, sustainable, smart and cost-effective solutions to its problems. I also think that other cities should consider and sometimes model its programs in the fields of environmental sustainability, land management, mobility, housing and health on the Curitiba approach. What needs to stop, however, is promotion of the view that the Curitiba model can be applied anywhere else, as a solution that has no shortcomings. In my work I have shown both the positive aspects of the policies and programs implemented there, as well as the critiques to this model and its shortcomings. The next few years will be especially crucial in reshaping Curitiba and try to address the needs of its residents in order to overcome the problems encountered so far with the current transportation system and the land and housing management more in general. The Master Plan and the sectorial plans currently under revision now are supposed to take care of the shortcomings of the model and they should incorporate the concerns and suggestions of the residents. I strongly believe that higher resident participation in the decision making process, through regular community consultation is crucial and it should take place in other cities as well. This process of consultation should not, though, stop at the planning phase. It should continue all throughout the implementation phase and a mechanism of monitoring and evaluation from the residents' side should be put at work.

In conclusion, I do believe that Curitiba can still serve as a model but if, and only if, we acknowledge and seek to mediate and avoid the less desirable results of its policies.

## BIBLIOGRAPHY

Bassett, Thomas E., and Andrea Marpillero-Colomina. "Sustaining Mobility: Bus Rapid Transit and the Role of Local Politics in Bogotá." *Latin American Perspectives* 40, no. 2 (March 2013): 135-145.

Bertolini, Luca, Frank le Clercq, and Loek Kapoen. "Sustainable accessibility: a conceptual framework to integrate transport and land use plan-making. Two test-applications in the Netherlands and a reflection on the way forward." *Transport Policy* 12, n. 3 (2005): 207-220.

Black, William R. "Sustainable Transportation: A US Perspective." *Journal of Transport Geography* 4.3 (1996): 151-159.

Bocarejo, Juan Pablo, Ingrid Portilla, and Maria Angélica Pérez. "Impact of Transmilenio on Density, Land Use, and Land Value in Bogotá." *Research in Transportation Economics* 40, no. 1 (April 2013): 78-86.

Boonen, Stein Aerts and Johan De Tavernier. "Which Sustainability Suits You?" In *Climate change and sustainable development ethical perspectives on land use and food production ; EurSAFE 2012, Tübingen, Germany, 30 May-2 June 2012*, edited by Potthast, Thomas Meisch, Simon, 43-48, Wageningen: Wageningen Academic Publishers, 2012.

Brugmann, Jeb. *Welcome To The Urban Revolution: How Cities Are Changing The World*. New York: Bloomsbury Press, 2009.

Cervero, Robert. "Linking urban transport and land use in developing countries." *Journal of Transport and Land Use*, Volume 6 Number 1 (10 April 2013): 7-24.

C40 Cities, "Bogotá's CicloRuta is One of the Most Comprehensive Cycling Systems in the World," accessed April 12, 2015. [http://www.c40.org/case\\_studies/bogotá's-cicloruta-is-one-of-the-most-comprehensive-cycling-systems-in-the-world](http://www.c40.org/case_studies/bogotá's-cicloruta-is-one-of-the-most-comprehensive-cycling-systems-in-the-world)

Cox, Peter. *Moving People: Sustainable Transport Development*. London: Zed Books, 2010.

Dempsey, Nicola, Glen Bramley, Sinéad Power, and Caroline Brown. "The social dimension of sustainable development: Defining urban social sustainability." *Sustainable Development* 19, no. 5 (September 2011): 289-300.

De Oliveira, Dennison. *Curitiba e o Mito da Cidade Modelo*. Curitiba: Editora Universidade Federal do Paraná, 2011.

De Oliveira, Márcio. “A Trajetória do Discurso Ambiental em Curitiba (1960-2000).” *Revista de Sociologia E Política*, no. 16 (June 2001): 97-106.

Gil-Beuf, Alice. “Ville Durable et Transport Collectif: le Transmilenio à Bogotá.” *Annales de géographie*, no. 5 (2007): 533-547.

Global BRT Data, accessed on March 13, 2015. <http://www.brtdata.org>.

Global BRT Data, “Latin America view. Key BRT Indicators per Country,” accessed on March 16, 2015. [http://brtdata.org/location/latin\\_america](http://brtdata.org/location/latin_america)

Global BRT Data, “Panorama per Region,” accessed on March 16, 2015. <http://brtdata.org/panorama/region>

Globe Sustainable City Award, “The Brazilian city Curitiba awarded the Globe Sustainable City Award 2010,” accessed on March 20, 2015. <http://globeaward.org/winner-city-2010.html>

Gómez, Jairo. *Transmilenio: La Joya de Bogotá*, Bogotá: Transmilenio SA, 2003.

Goodland, Robert. “Sustainability: Human, Social, Economic and Environmental”, [www.balticuniv.uu.se/index.php/component/docman/doc\\_download/435-sustainability-human-social-economic-and-environmental+&cd=1&hl=en&ct=clnk&gl=us&client=safari](http://www.balticuniv.uu.se/index.php/component/docman/doc_download/435-sustainability-human-social-economic-and-environmental+&cd=1&hl=en&ct=clnk&gl=us&client=safari), 2002, 1.

Hidalgo, Dario and Aileen Carrigan. “BRT in Latin America High Capacity and Performance, Rapid Implementation and Low Cost.” *Built Environment* 36, no. 3 (October 13, 2010): 283-297.

Hutton, Barry. *Planning Sustainable Transport*. London: Earthscan Ltd, 2013.

Institute for Transportation & Development Policy, “The Scorecard,” accessed on April 10, 2015. <https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/the-scorecard/>

Institute for Transportation & Development Policy, “What is BRT?” accessed on March 20, 2015. <https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/what-is-brt/>

Instituto de Pesquisa e Planejamento Urbano de Curitiba. "Memória da Curitiba Urbana. Escola Ecológica de Urbanismo." *Revista do IPPUC*, Instituto de Planejamento e Pesquisa Urbana de Curitiba, 1992.

Irazábal, Clara. *City Making and Urban Governance in the Americas: Curitiba and Portland*. Aldershot, England: Ashgate, 2005.

\_\_\_\_\_. "Localizing Urban Design Traditions: Gated and Edge Cities in Curitiba." *Journal of Urban Design* 11, no. 1 (February 2006): 73-96.

\_\_\_\_\_. "Urban Design, Planning, and the Politics of Development in Curitiba," In *Contemporary Urbanism In Brazil: Beyond Brasília*, edited by Rio, Vicente del Siembieda, William J., 202-223. Gainesville: University Press Of Florida, 2009.

Jaime Lerner e Associados, "Jaime Lerner," accessed on January 20, 2015.  
<http://www.jaimelerner.com/bio-en.html>.

Lehtonen, Markku. "The environmental–social interface of sustainable development: capabilities, social capital, institutions." *Ecological Economics* 49, no. 2 (2004): 199-214.

Litman, Todd and David Burwell. "Issues in Sustainable Transportation." *International Journal of Global Environmental Issues* 6, no. 4 (2006): 331-347.

Macedo, Joseli. "Curitiba." *Cities* 21, no. 6 (2004): 537-549.

\_\_\_\_\_. "Planning a Sustainable City: The Making of Curitiba, Brazil." *Journal of Planning History* 12, no. 4 (November 2013): 334-353.

Menezes, Claudino Luiz. *Desenvolvimento Urbano E Meio Ambiente: A Experiência de Curitiba*. Campinas: Papyrus Editora, 1996.

Moavenzadeh, Fred and Michael J. Markow. *Moving Millions. Transport Strategies for Sustainable Development in Megacities*. Dordrecht, the Netherlands: Springer, 2007.

Montgomery, Charles. *Happy City: Transforming Our Lives Through Urban Design*. New York: Farrar, Straus and Giroux, 2013.

Moore, Steven. *Alternative Routes to the Sustainable City: Austin, Curitiba, and Frankfurt*. Lanham: Lexington Books, 2007.

Muñoz, Juan Carlos, and Antonio Gschwender. "Transantiago: A Tale of Two Cities." *Research in Transportation Economics* 22 (January 2008): 45-53.

Muñoz, Juan Carlos, Marco Batarce, and Dario Hidalgo. "Transantiago, Five Years after Its Launch." *Research in Transportation Economics* 48 (December 2014): 184-193.

Organization for Economic Co-operation and Development. *OECD Guidelines Towards Environmentally Sustainable Transport*. Paris: OECD, 2002.

Peñalosa, Enrique. "A City Talks: Learning from Bogotá's Revitalisation." *Architectural Design* 81.3 (2011): 90-95.

Rabinovitch, Jonas. "Curitiba: Towards Sustainable Urban Development." *Environment and Urbanization* 4, no. 2 (1992): 184-193.

Sánchez García, Fernanda Ester *Cidade espetáculo: política, planejamento e city marketing*. Curitiba: Editora Palavra, 1997.

Schiller, Preston L., Eric Bruun, and Jeffrey R. Kenworthy. *An Introduction to Sustainable Transportation : Policy, Planning and Implementation*. London: Earthscan Ltd, 2010.

Seghezzeo, Lucas. "The five dimensions of sustainability." *Environmental Politics* 18, no. 4 (July 2009): 539-556.

Seguridad, Justicia y Paz, "San Pedro Sula (Honduras) la ciudad más violenta del mundo; Juárez, la segunda," accessed on April 10, 2015.

<http://www.seguridadjusticiaypaz.org.mx/biblioteca/summary/5-prensa/145-san-pedro-sula-honduras-la-ciudad-mas-violenta-del-mundo-juarez-la-segunda>

Smith, Harry and Jeremy Raemaekers. "Land use Pattern and Transport in Curitiba." *Land Use Policy* 15.3 (1998): 233-251.

Strange, Tracey, and Anne Bayley. *Sustainable Development: Linking Economy, Society, Environment*. Paris: Organisation for Economic Co-operation and Development, 2008.

Taniguchi, Cassio. "Curitiba and Sustainability." In *Cityedge: Case Studies In Contemporary Urbanism*, edited by Esther Ruth Charlesworth, 198-208. Oxford: Architectural Press, 2005.

TED, "Jaime Lerner: A song of the city," accessed on December 14, 2014.

[https://www.ted.com/talks/jaime\\_lerner\\_sings\\_of\\_the\\_city](https://www.ted.com/talks/jaime_lerner_sings_of_the_city).

Tlaiye, Laura. *Successful Environmental Institutions: Lessons from Colombia and Curitiba, Brazil*. Washington, D.C: World Bank, Latin America Technical Dept., Environment Unit, 1994.

Transportation Research Board. *Integrating Sustainability into the Transportation Planning Process*. Washington, D.C.: Transportation Research Board, 2005.

United Nations Conference on Environment and Development. *Agenda 21*. United Nations Conference On Environment And Development (UNCED), 3-14 June 1992, Rio De Janeiro, Brazil. New York: United Nations Dept. Of Public Information, 1993.

United Nations Human Settlements Program, "Planning and Design for Sustainable Urban Mobility. Global Report on Human Settlements 2013," UN-HABITAT: New York, 2014

Urbanização de Curitiba, accessed on April 12, 2015. <http://www.urbs.curitiba.pr.gov.br/>

Urbanização de Curitiba, "Rede Integrada de Transporte," accessed on April 12, 2015. <http://www.urbs.curitiba.pr.gov.br/transporte/rede-integrada-de-transporte>

Vallance, S., H. C. Perkins, and J. E. Dixon. "What is Social Sustainability? A Clarification of Concepts." *Geoforum* 42 no. 3 (2011): 342-348.

Yáñez, María Francisca , Patricio Mansilla, and Juan de Dios Ortúzar. "The Santiago Panel: Measuring the Effects of Implementing Transantiago." *Transportation* 37, no. 1 (August 26, 2009): 125-149.

World Bank. *Eco2 Cities. Ecological Cities as Economic Cities*. Washington, D.C. : World Bank, 2010.

World Bank. *Sustainable Transport : Priorities for Policy Reform*. Washington, D.C. : World Bank, 1996.

World Commission on Environment and Development. *Our Common Future*. Oxford; New York: Oxford University Press, 1987.