A MIXED-USE AND WALKABLE BOGOTÁ:  
A Transit-Oriented Strategy for the City’s First Fixed-Rail Public Transit Corridor  
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A capstone thesis paper submitted to the Executive Director of the Urban & Regional Planning Program at Georgetown University’s School of Continuing Studies in partial fulfillment of the requirements for Master of Professional Studies in Urban & Regional Planning.

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ABSTRACT

This project explores the creation of an urban planning framework to improve land use near metro stations in Bogotá. This framework will make the new proposed metro stations in Bogotá vibrant community places that attract new investment in housing, office, and retail development. The research looks at lessons-learned from previous transit systems like TransMilenio and how cities like Medellín, Washington, D.C., and Hong Kong have created vibrant and sustainable transit-oriented development (TOD) that Bogotá can replicate in its own way. This research is based on the public proposals for Metro, studies made by the city and multilateral development banks, existing research in other cities, and interviews with leading experts in the field. Through this research I advance new urban development options for Metro stations and their areas of influence. The paper recommends TOD strategies to make transit more democratic and to avoid future gentrification and displacement in station areas.

KEYWORDS


RESEARCH QUESTIONS

1. What are the global best practices of land use policy reforms in conjunction with major transit investments in Latin America and other regions?

2. What are present-day barriers to implementing comprehensive transit policies in Bogotá?

3. What iterative steps are necessary to create a comprehensive TOD strategy in Bogotá?
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INTRODUCTION

“We don’t have planning for this much people, neither in roads, education, or jobs, and this made Bogotá collapse”¹

Figure 1: View of the mountains – Bogotá

Moving around Bogotá is a nightmare. Traffic is horrible, public transit doesn’t have any sort of priority, and there are not enough mobility options for a city with more than 8 million people. I can say this with some authority because Bogotá is my city, and I lived there for more than 25 years.

Metro, Bogotá’s newly financed fixed-rail public transit line, will change the face of the city and the way people move around. But this change will not only pertain to transportation, being an above-ground metro, it will also influence the landscape and land use around its corridor and stations. If done and planned right, it can encourage investment, increase land values, and create a

TOD corridor on one of the city’s most iconic roads. If done badly, it can be a repetition of the lack of urban planning involved in the first corridor of TransMilenio, which caused deterioration of the area, crime, and land values to go down. It is important to note that Metro’s first line will go along this same corridor, with all the opportunities and issues that this entails and that will be analyzed later in this paper.

But Metro will not only contribute, if done right, to creating a TOD corridor in Bogotá, it will also help reduce transportation greenhouse gas emissions in the city. A massive public transit system will get people from Bogotá out of their cars, and TOD in this corridor will help reduce the number of daily single-vehicle trips. In a city that is drowning in pollution, transportation goes hand in hand with air quality, public health, and public safety. Talking about public pollution, Bogotá has an average Air Quality Index (AQI) of 88 PM2.5, making it one of the most polluted in Latin America, whilst New York City, a city with comparable population (not counting people going into the city just for work or other activities) has an average AQI of 44 PM2.5. True, “Bogotá is a typical Andean high-altitude polluted city-in-a-bowl” which makes it more prone to pollution, but New York City is a more industrialized city. The differences are that New Yorkers use more public transportation and that significant efforts have been made to clean the air. A change needs to happen immediately. Metro can be part of this change and of the solution. With trains run by clean energy, well planned stations that encourage development, efficiency, and speeds that reduce travel times, Metro can create a better city for all.

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This paper will analyze Metro studies and proposals and create a plan with recommendations that will improve the quality of life of all the people from Bogotá. There will be a chapter dedicated to gentrification and displacement, and analysis and examples on how to avoid displacement in the new TOD corridor. Improvements in the urban environment should be enjoyed by all, and the benefits should be seen by the whole city.

But, before I begin with the analysis, it is important to define TOD for the purpose of this paper. TOD stands for Transit-Oriented Development and it is an approach used by cities and transit agencies around the world to reduce vehicle trips and increase ridership of their transit systems. To achieve this, cities and developers use different tools to make areas attractive and financially viable. For example, TOD areas usually have more density than others, this is achieved by using overlay zoning, density bonuses, and creating inter-agency work groups to achieve common goals. TOD areas must have mixed land uses so many of the daily needs of residents and workers can be met within walking distance, thus reducing single occupant vehicle trips.

It is important to understand what experts and transportation agencies think TOD is. TOD doesn’t have a universal definition, this is because “development that would be considered dense, pedestrian friendly, and transit-supportive in a middle-size city in the Midwest would be viewed quite differently in the heart of Manhattan or the District of Columbia”. This lack of a universal definition, or of agreement in creating one, is a big obstacle for TOD and for cities trying to sell this type of improvement to developers and banks. But, for the purpose of this paper, the definition that will be used is the one given by the Washington Metropolitan Area Transit authority (WMATA). According to WMATA, TOD refers to “projects near transit stops which incorporate the following smart-growth principles: reduce automobile dependence; encourage high shares of

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pedestrian and bicycle access trips to transit; help to foster safe station environments; enhance physical connections to transit stations from surrounding areas; and provide a vibrant mix of land-use activities”. This definition embodies the most important aspects of TOD, and is being used in this research because the Washington, D.C. Metropolitan Area, has had great success in developing transit-supportive areas and neighborhoods.

The main objectives of TOD are increasing ridership and revenue income, community development, and smart-growth. Since this type of development is expensive and requires involvement from the local governments and transit agencies, the national government (in Bogotá’s case), and the private sector, it is usually done through public-private partnerships (PPPs). “As long as TOD confers both public and private benefits, there is no replacement for public-private partnerships in advancing TOD implementation. Each party brings unique talents, insights, and resources to the table”. Sadly, this is not being done in the Metro project in Bogotá. In this paper I create a framework that incorporates a sketch of a proposal for creating a PPP to improve revenue, density, and land uses.

Although land-use control is managed by the city government, and they are the ones that have the power to change zoning and regulations to make TOD a reality, transit agencies influence land-use decisions through cooperative arrangements and partnerships with governments. These transit agencies (in this case Metro) control the agency-owned properties. However, TOD is so much more than developing or redeveloping a station; TOD is meant to change and improve a whole area or neighborhood by improving accessibility and articulation between people and public services. For that, local governments and transit agencies need to work together. TOD is about

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6 Ibid., 6
7 Ibid., S-13
developing nodes around transportation stations, and if there’s no team work between different agencies and institutions, this goal cannot be achieved.

One of the most important benefits of TOD is that it reduces sprawl, a phenomenon that is becoming more common in Bogotá and its surrounding areas because there is little space in the city due to its lack of vertical density. This is causing more congestion and energy usage; TOD can help reverse this trend. “Since World War II, two mutually reinforcing processes have characterized U.S. cities: decentralization and an increasing reliance on the automobile”.\(^8\) American cities have sprawled towards the suburbs and this has meant that people depend on cars to commute to their jobs, buy groceries, and do other activities. “This, combined with heavy investment in roads and other implicit subsidies of automobile use, combined with comparatively low levels of transit funding, have facilitate decentralized urban development patterns and inefficient use of land”.\(^9\) Bogotá is going through this same process, and that is why it is important to look at the American model, to do the exact opposite or follow the examples of successful cities such as New York city. Metro and TOD planning can reverse this pattern in Bogotá, and it is not too late to start now. TOD is about reversing these patterns, making the urban core around transit denser, and minimizing vehicle use.

Other benefits of TOD include the development of mixed land uses, because a TOD area needs to have amenities, commerce, office space, and housing to be successful. People need to have everything they need inside a walking or short transit distance perimeter. This discourages single occupant vehicle trips, because people can move around, commute, shop, and do leisure

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activities without the need for a car. It also reduces traffic congestion in the area, the isolation and lack of amenities that can be found in the suburbs and increases urban investment.

Another important benefit, and the reason government stakeholders should be interested in developing TOD is that it increases ridership, thus increasing revenue for cities. Density, accompanied by mixed-use development, helps increase ridership because more people are living and working in an area, and these people need to move around, either to get home, to commute to work, shop, and do other activities that the area promotes. Quality public transit increases property values (and property taxes) on stations adjacent land and provide low cost mobility and access to citizens.

In the next chapters, the benefits of TOD will be analyzed with successful examples from around the world and a context of Bogotá will be given so the reader can understand how important is the new metro to the city and how TOD can transform Bogotá into a more pedestrian friendly city with more opportunities for all.
RESEARCH METHODOLOGY

The research strategy, the research method, the research process and the type of data analysis. This paper was done using primary and secondary sources, as well as the review of existing project documentation for the fixed-rail project proposed for Bogotá. This research concludes with a proposed TOD framework for the city and recommendations by the author to apply this TOD strategy in future Metro stations. Here are the steps I took:

1. Conduct literature review of secondary sources which explore how to implement comprehensive infrastructure and policy programs for TOD.
2. Review all existing project documentation which is publicly available, including project specific sources at the World Bank (WB), the Inter-American Development Bank (IDB), Metro, and the city.
3. Perform metropolitan analysis to determine the prototypical urban conditions within Bogotá.
4. Prepare draft framework for new comprehensive TOD strategy
5. Review draft framework with key thought leaders and senior transportation specialists from multilateral development banks.
6. Finalize recommendations.
There is extensive literature on Transit-Oriented Development (TOD) and Urban Planning. This review will focus on providing a frame of reference for TOD approach in Bogotá. This will be useful for creating a strategy for the implementation and adoption of TOD in the proposed first fixed-rail public transit line, or metro, in the city. This review will begin by defining TOD before continuing to give some history and context on mobility and transportation issues in the Bogotá, finishing with an analysis of why the city needs a metro and what have been the steps taken to assure this happens for the city.

What is TOD?

As stated in the introduction, this paper will define TOD as “projects near transit stops which incorporate the following smart-growth principles: reduce automobile dependence; encourage high shares of pedestrian and bicycle access trips to transit; help to foster safe station environments; enhance physical connections to transit stations from surrounding areas; and provide a vibrant mix of land-use activities”.

By this definition, TOD will be an essential approach for the new metro stations in Bogotá because this way the city can create walkable and sustainable communities, tackle its housing crisis, combat sprawl, improve mobility and transportation within the city, improve the lives of millions of people, and create vibrant spaces that will be a safe space for all.

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Transportation and Mobility in Bogotá

According to the United Nations, Bogotá, Colombia, is the only city outside Africa or Asia poised to become a new megacity (a city with more than 10 million people) by 2030. This brings tremendous obstacles and issues that the city is probably not ready to confront. According to Professor Fabio Zambrano, from the Urban Studies Institute of the Universidad Nacional de Colombia, it will be impossible to continue to manage urban realities of more than 8 million people with municipal models taken from policies and context of more than 2 centuries old.

<table>
<thead>
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<th>2010</th>
<th>2020</th>
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<td>7’364,000</td>
<td>8’381,000</td>
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<td>Sabana</td>
<td>1’197,000</td>
<td>1’349,000</td>
<td>2’086,000</td>
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<td>16 municipalities – increment</td>
<td>152,000</td>
<td>889,000</td>
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<tr>
<td>Bogotá – Sabana</td>
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<td>8’856,000</td>
<td>10’467,000</td>
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<tr>
<td>Increment</td>
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<td></td>
<td>2’430,000</td>
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</tbody>
</table>

Table 1. Population projections 2005-2010-2020
Source: DANE Population Projections Census 2005

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But Bogotá not only has to deal with becoming a megacity, now the reality is that its area of influence covers more than 12 million people, by 2030 this will be much more, and if current policies and transportation alternatives continue as they are, the city will be unsustainable. Bogotá needs to prepare for this scenario, and it also needs to lead the creation of a metropolitan area that includes neighbor municipalities that contribute with people and goods to the region’s operation. True, when a metropolitan area is created not every impact is positive, other jurisdictions in the region also bring their problems to the table, such as poverty and crime, but it is easier to tackle these problems with the support from your neighbors than doing it alone, and the total benefits can outweigh the costs.

Mobility and transportation are the biggest issues in the list of urban policies that must be implemented in a chaotic city such as Bogotá. These issues are interconnected with access to better jobs, inequality, quality of life, public safety, amongst others. Bogotá needs to step up and find solutions to its mobility problem soon, or else it will not be a competitive city in the future. Bogotá is only one of the few cities with more than 6 million people that doesn’t have a fixed-rail public transit corridor (from now on referred as metro). Moving people around has become a complicated issue, and when the fact arises that Bogotá is a large and sprawling city, burdened by regulation, with poor planning and development practices, the puzzle becomes almost impossible to solve. On the other hand, Bogotá has many possibilities for nodes of transit-oriented development, with much greater vertical density and mixed land uses that could transform the city and make it much more livable for residents of the region. TransMilenio, Bogotá’s BRT system changed the lives of millions of people when it was first implemented in 2000, but it has become an overcrowded system with low approval rates.¹⁵ This system is being used as a mass transit system (which in

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theory it is, but in practice it is not)\textsuperscript{16} when for practical purposes it is a medium transit system that cannot take the amount of demand that the city needs.

Next an introduction to Bogotá and its mobility context will be given, followed by two examples of TOD implementation in the world, an urban renewal example, and will end with recommendations for implementing TOD in Bogotá’s new metro system.

\textsuperscript{16} According to geopath, mass transit transportation are public conveyances such as buses, trains, subways and other rapid transit commuter sytems. \url{https://geopath.org/transit-glossary/}
BOGOTÁ URBAN MOBILITY:
HISTORY AND CONTEXT

"An advanced city is not a place in which poor people can move by car, it is a place where even the rich use public transit”¹⁷

Planning in Bogotá

To understand the mobility crisis in Bogotá it is important to first understand a little bit about the city.

Bogotá was founded on August 6th of 1538 by Gonzalo Jiménez de Quesada and his group of conquistadores. The story goes that the city had a church and 12 houses, and since then it has grown nonstop. It has suffered the many conflicts that have characterized the country and is where the political and administrative power is located. It is a vibrant city with more than 8 million people, with green spaces, excellent restaurants, good people, an unbelievable history that could have been taken from a Gabriel García Marquez novel, and it is surrounded by the most fabulous mountains you can find anywhere. But not everything is good. The city has gone through a


complex urbanization process in the last 60 years. “During this period the city received large contingents of migrants from many provinces around the country; population almost doubled; social and economic activities grew more dynamic and complex (...) But for lack of prospective planning, ecological knowledge, city vision and management of urban, development, as well as commitments of social solidarity and integration, and political will of its ruling class, and other shortcomings, all this interesting sociocultural and urbanistic process became conflictive, territorial occupation operated contra natura, production became predatory, quality of life became precarious, social segregation was strengthened and the functionality of the city began to get stuck, until it reached the current point of proximity to collapse”. ¹⁹

This very short summary should give an idea of urban processes in Bogotá to the reader, but the city is so much more. Treatises and encyclopedias could be written about the Andean city, but the purpose of this paper is different. Let’s continue to the transportation side of the issue.

**Transportation and mobility in Bogotá**

“Mobility and transit problems were, and still are, a consequence of the enormous demographic growth of the city and the constant expansion of its urban perimeter. The Royal Street, currently 7th Avenue, was Bogotá’s main road since colonial times (it still is), but at the end of the XIX century modernization of urban transportation modes arrive in Bogotá expanding the city until it became one of the densest in Latin America”. ²⁰

Bogotá is paying the price of not addressing its mobility issues. This means that the city could have done certain interventions in the past that would have changed the face of the city today, but by lack of political will, high economic costs, or not needing certain things at that moment, it has to do them now with higher political, social, and economic costs than before. The

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city has been trying to build a metro for 70 years, and each time it has failed, now it wants to build it again, but costs have gone higher and instead of having a robust underground metro system the city will have a metro line.

According to Mayor Enrique Peñalosa, the equivalent of a 600-kilometer (372.823 miles) long line of cars enters Bogotá each year.\(^{21}\) 600 kilometers of roads cannot be built annually and, moreover, this is not a solution for solving the mobility crisis in the city. Imagine it was possible to build these many roads. The problem will persist because there is something called the congestion paradox or the Braess Paradox,\(^{22}\) which states that adding more capacity to a network can reduce the performance of the entire network. This happens because people choose which route to take selfishly, they choose the route that best suits them individually and they will look for a route that represents less travel time. Braess showed that adding more channels to a network, lanes to a road, worsens performance for all users. This is a paradox because when cities invest in new roads they expect travel times to decrease and not increase as is the case here.

This is not to say that Bogotá doesn’t need new roads. This must happen and happen soon because the city needs urgent infrastructure improvements. The problem here is that the city can’t be concerned only with building new roads and improving infrastructure for private cars. Improving public transit and increasing ridership, more walking, and bicycle use need to be a priority for the city and its planners. Public transit needs to be democratic and investing heavily in this type of transportation will decrease traffic and might change some social and class horrible behaviors in the city.

**Understanding the ownership and use of cars in Bogotá**

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According to the Environmental Observatory of Bogotá, from 2007 to 2017, the number of private cars in the city grew by approximately 206% (from 839,251 in 2007 to 2’182,578 in 2017).\(^2\) Meanwhile, according to the National Administrative Department of Statistics (DANE), the population of the city grew by 1’030,506 people or 13% in the same amount of time.\(^3\) It is no surprise that traffic in Bogotá is getting worse, and that moving by car has become a nightmare.

There are many reasons why the traffic jams in Bogotá are monumental. There is a lack of roads and adequate infrastructure, but also there is traffic because there are cars and because in Bogotá, if you have a car, you don’t walk more than 3 or 4 blocks if you can avoid it. It might be a cultural thing or a public safety issue, but it is the reality. According to the report of global congestion made by the analysis company INRIX,\(^4\) Los Angeles has the worst traffic jams in the world (this study was made in 1,360 cities in 28 countries), and Bogotá is number 6 on this list. In addition, in the first 30 positions on the list there are 6 Latin American cities and 3 of these are in Colombia, showing that it is a generalized problem in the country. Road infrastructure in the country, although improving, is so precarious that it affects the economy, productivity, efficiency, and quality of life of Colombians in general.

The reality is that Los Angeles is not the worst city in the world to drive in, it is Bogotá, and this can be demonstrated using the same INRiX report. The media used the metric that shows how many hours in a year a person spends on average in the car during peak hours, and in Los Angeles this makes sense because driving distances are long (from 40 to 60 kilometers of travel). The report has an indicator that may be more relevant to make a comparison between cities: the percentage of time that is lost in a traffic jam considering the total time a person is in the car. This

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\(^3\) "Reloj De Población." DANE. [https://www.dane.gov.co/reloj/](https://www.dane.gov.co/reloj/).

indicator is better for comparing cities because it is independent from the commuting distance. In Los Angeles people can drive 2 hours and travel 60 kilometers, in Bogotá a person can drive for 1 hour and travel 10 blocks. This indicator also shows that in Bogotá the difference between peak hours and off-peak hours is almost zero, in Bogotá there is an eternal traffic jam. Using this indicator, Bogotá is, by far, the city with the most traffic jams in the world because there is one 30% of the time. The cities that follow are Moscow with 26% and Krasnodar with 25%, both in Russia.

The *pico y placa*, a system that removes cars from roads on certain days depending on the last number of the license plate, was proposed as a solution for the city’s congestion while public transit was fixed. According to Emma Camargo Díaz and other researchers, this measure was a great failure, and a high quality public massive transport system that can mobilize 10 million people is nowhere to be seen. With the measure of the *pico y placa* many households bought a second or third car, and with the economic growth of the country and the city, more and more people are being able to buy their first car. People who increase their purchasing capacity in Colombia get off public transit and never return. In a truly democratic society and with good public transit this will not be the case.

In Bogotá, moving around by public transit or by car takes roughly the same amount of time, and in the car, it is always more comfortable. If buses worked the way they should, then Bogotá would have an efficient transportation system, which allows people to get to work and move around while reducing vehicle miles traveled (VMT), and if a real strategy to reduce travel

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times were to be implemented, surely people will prefer to travel by bus, BRT, or metro. Bogotá has one of the worst public transit systems in the region, and comparative data from other capitals show that Bogotá has a serious problem. The average time that people spend on public transit every day is 97 minutes, 32% of people using transit have long trips (which is an important reason to combat sprawl), people wait 20 minutes in average on transit stops for their ride and 40% have to wait more than 20 minutes every day. Also, 67% must make at least one transfer during their trip (showing that public transit routes are not well planned to move around the community they serve), and 19% make more than 1 transfer.  

**Public Transportation**

According to Bogotá’s Mayor, Enrique Peñalosa, TransMilenio moves more people in one day than most metro systems. The articulated and biarticulated buses have an approximate capacity for 240 people each. The system moves 2.2 million people each day in 1,609 buses. This only shows that Bogotá’s public transit is terrible, because it doesn’t have the capacity to supply the demand with the existing fleet. It is terrible not because TransMilenio is a bad system, but because the city lacks a real mass transit system like a metro. Washington, D.C.’s metro moves around 598,000 passengers per weekday in mostly 8 car trains that run every few minutes. Bogotá has a BRT system that is working at more than full-capacity, making trips long, uncomfortable, and dangerous for passengers.

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After living in Bogotá for most of my life I can ascertain that one of the main flaws of the city is its public transportation system. Apart from the BRT there are no differentiated lanes for public and private transportation. There are some separated lanes for buses on the most important streets, but cars, taxis, and other vehicles don’t respect them, making them obsolete. This is not just an enforcement issue (although enforcement will surely make the situation better) but it is also a cultural and educational issue, where people don’t respect public spaces and public services. Another problem is that buses are old, this has changed a little since the partial implementation of the SITP (Integrated Public Transit Service), but there are still buses that expel high amounts of greenhouse gas emissions. In Bogotá, the average age of buses is 14 years, making them inadequate for passenger transport because they are old, generate emissions that could be reduced, and normally are not in very good shape.

Trips are too long, and people take extreme amounts of time to get from one place to another. This is not because of the buses, it is because there are too many vehicles on the streets,

Figure 4: Map of TransMilenio

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Despite restrictions imposed on 50% of private vehicles every day. But there are too many public transit vehicles as well, and without a proper traffic management strategy this makes the city look like chaos.

Since in Latin America people that use public transportation are usually from lower-income households, their trip length is a show of inequality in the city. According to the authors of the book “From Transportation to Urban Mobility in Bogotá” the percentage of income spent on commuting rose from 11% in 2008 to 12.2% in 2009 for strata 1 and 2; whereas for strata 5 and 6 this portion increased only from 5% to 6.4%, showing that transportation in the city can improve because it still is an inequality facilitator and because the city transportation planners have prioritized private vehicles instead of public transit.

Another sign of how transportation can increase inequality is the lack of minimum facilities for seniors, children, and people with disabilities. Buses don’t lower for boarding and don’t have safe spaces for wheelchairs. Apart from a couple of chairs for senior citizens (which are rarely ceded), there are no other options than to try to find a space in the overcrowded buses. Also, there are no spaces for bicycles on buses. In many cities, buses have racks in the front where people can secure their bicycles while they travel without causing inconveniences to other passengers. This is a great solution to the first-mile/last-mile problem in accessing public transit.

As stated before, Bogotá has a public transit crisis, and users know it. In 2017 the Integrated Mass Transit System (SITM) had 1.51 billion passengers and traditional transit mobilized 417.4

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34 Socioeconomic stratification is a classification in strata of the residential real estate that must receive public services. It is done mainly to charge in a differentiate way by strata the residential public services permitting to align subsidies and charge contributions in that area. In this way, people with more economic power pay more for this service and contribute so that lower strata can pay less. "Estratificación Socioeconómica Para Servicios Públicos Domiciliarios." DANE. https://www.dane.gov.co/index.php/en/procedures-and-services/information-services/socioeconomic-stratification.
million passengers, showing an 11% decline in passengers from 2016. According to Bogotá Cómo Vamos, the SITP is close to collapsing. There are many factors that are making users get off public transit and choose walking, bicycling, motorcycling, and cars instead. The operating companies are broke, buses are old, and service is unreliable. Only 32% of people are satisfied with the service that was supposed to change the transit face of the city. The SITP idea is amazing on paper, if it was implemented fully and properly it would have changed old and dirty buses that stopped anywhere and didn’t respect official routes, into a multimodal transit system with better service. This would have changed the lives of millions of Bogotanos. The system continues to be the same, the owners are still the same families as before, and people don’t use it. There are still around 4,000 old buses marked as Provisional SITP that still cover old routes, don’t have electric payment, and ignore official stops.

Greenhouse gas emissions are also a troubling issue with public transit in Bogotá. Most buses, if not all, run on diesel, TransMilenio too. This added to the age of buses is a terrible mix for air quality and citizen’s health. Being required by the Office of the Inspector General to include clean technologies in the bidding for new city buses, Peñalosa’s answer was to blame the health problem caused by bad air quality in the city on dust. This issue is not going to be resolved any time soon. The adjudication process for the new TransMilenio buses ended on November 3rd, 2018, and there are no renewable or clean energies anywhere to be seen. 6 of every 10 buses will continue to run by diesel (688 in total), and 4 will run by natural gas (474), a cleaner option but still less than optimal.

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Planning the New Metro

In 1942, the mayor of Bogotá Carlos Sanz de Santamaría proposed the construction of a metro that was parallel to the eastern mountains of the city. In the 1950s, when Fernando Mazuera Villegas was mayor, he buried the tram tracks and began the process to contract the Metro studies with the company of the New York Metro. Like them so many other past administrations have promised a metro system for Bogotá. Clearly, after 75 years we can say, without fear of making mistakes, that none of the studies, proposals or good intentions have yielded any fruit, until now.

The history of the Bogotá Metro has been a long one, and there is still no metro in sight, although this time things are looking up for the city and this project has more changes of being built. Mobility is getting worse and worse, and it is one of the few cities with more than 7 million inhabitants that does not have a metro. The administration says TransMilenio is a system that can replace a metro, but in reality, it is not. If mobility in Bogotá is to improve, it is important to understand how each of these systems (buses, BRT, metro, etc.) work and how they serve the city. The articulated buses of TransMilenio have an approximate capacity of 240 people per bus, a metro train with 6 cars, as will be the case in Bogotá, can fit around 600 or 650 people.

The purpose of this research paper is not to take merit away from TransMilenio. This system was the first to revolutionize mobility in Bogotá and is part of the Bus Rapid Transit

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BRT movement. TransMilenio moves 2.2 million people per day in a fleet of 1,379 articulated and 230 biarticulated buses. According to studies by Darío Hidalgo, it has achieved important benefits in terms of road safety by reducing fatalities by 88% in traffic accidents in the bus corridors. In terms of environmental impacts, TransMilenio reduced emissions generating savings in health costs estimated at $114 million over a period of 20 years. BRT is a high-quality bus-based system that provides fast, convenient and affordable service in metropolitan areas. It does so through dedicated lanes for buses and with stations, usually located in the central lanes of the road. As it contains elements like those of a light rail or subway system, it is much more reliable, convenient, and faster than regular bus service. It is able to avoid the causes of delay that usually affect regular bus services. It can be deduced that TransMilenio should be expanded in Bogotá, especially by corridors such as Carrera Septima to improve mobility and that this BRT system should feed passengers to the metro, not the other way around. TransMilenio can reach places that metro is not able to reach with the current plans for one line. The BRT system can take passengers from these places and take them to transport hubs where they can take the metro. Think of Union Station in Washington, D.C. or Grand Central Station in New York City.

But the plan to integrate TransMilenio and Metro is to make them complimentary and share the same service lines. There is a TransMilenio lane in the Avenida Caracas, one of the main roads in the city. Metro will serve this very same road, and the city won’t take TransMilenio from the trunk road. As stated before in this paper, TransMilenio needs to feed metro and it is an incredible system that can reach places where the metro can’t, but putting both systems to compete will not help mobility in the city and it will probably won’t increase ridership, on the contrary, one of the systems is likely to experience a loss in ridership and revenue. What this plan is going to do is that it will cause these two systems to compete and users will continue to use the cheapest option, even if this means overcrowding, slower commutes, and bad services. BRT is not comparable to Metro, no matter what the Mayor says, and it should serve as a way for people to get to the Metro, not as a competing transit mode.

It is important to clarify that the metro will not solve all the mobility issues of the capital, but it will be an important addition to the list of modes of transportation in the city and the only

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system capable of mobilizing millions of people without the overcrowding of TransMilenio. For now, let's focus on the metro project of Mayor Enrique Peñalosa, which seems to finally solve one of our problems.

The metro operation is expected to start in 2022 and have approximately 23 trains. It will have a length of 25.29 kilometers, it will be 100% elevated and it will be built in three stages. Stages 1 and 2 are already funded and will go from Carrera 96 to Calle 72. They will have 16 stations, each 1.39 kilometers (on average), and 10 of these will have an exchange with TransMilenio. On the website of the metro one of the ways to achieve that the subway passage is similar to that of TransMilenio (COP$2,200, around USD$0.73), is to have few stops. Approximately USD$0.73 might not look like much, but in a city where the minimum wage is COP$781,242 or USD$260.84, taking a minimum of 2 daily trips costs around USD$30, 12% of total wages. Also, as analyzed before, low-income households spend more of their income in transportation.

![Figure 6: Metro stations and their services.](http://www.metrodeBogotá.gov.co/que-es-metro)

Why will the metro be elevated? Mainly because we are paying the price of not doing. If it had started to be done 75 years ago, the prices of construction, land, and properties would be much lower than they are today in a city that is already built and has high construction densities. Speaking of the price of not doing, a small parenthesis: the stations will be designed and built for six-car trains. Cities like Washington D.C. and New York City are making a huge effort to change trains to eight-car trains, because six are not enough. A problem that we are going to have to start worrying about before the works begin, something similar to what happened with El Dorado airport, which was deemed too small before even commencing operation.49

The Administration’s explanation is that it is the most viable alternative considering the available budget. Bogotá’s Metro will not have a PPP and thus funding is scarce. Later in this paper a proposal will for PPP will be designed when the TOD framework is presented. The National Development Finance was requested to contract the alternatives studies. The French firm Systra50 was hired, and it evaluated and compared eight route length options through 31 indicators. The conclusion was that the form of viaduct or elevated metro was the best for the city.51

But, as said before, mobility in Bogotá is not going to be solved with just one metro line, so the mentality of citizens has to be changed as well. No single intervention has the power to solve all the issues, so the change begins with the city as a whole. Investments in transport must respond to a comprehensive development plan of the city, which considers a long-term projection and has a focus on citizens. These plans exist: The Territorial Arrangement Plan (POT)52 and the

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Mobility Master Plan\textsuperscript{53}. But these need to be updated and better integrated between each other. Since they are old, the Metro project is not yet explained and included in these plans.

EXAMPLES OF TOD AROUND THE WORLD

Arlington Country Roslyn-Ballston TOD and Hong Kong TOD were selected as good examples of TOD around the world for this paper because they have created walkable, mixed-use, and high-density areas around metro stations. I chose them because I think Bogotá can learn many lessons from these two examples and because there are elements in each of these models that the city can replicate, with personalized changes, to the new metro line. Next I will present both of these models and show some key finding for Bogotá and explain how they should be implemented.

Arlington County Roslyn-Ballston ‘bull’s eye’ TOD:

The Arlington County “bull’s eye” TOD concept was started in the 1970s to combat sprawl and make the corridor from Roslyn to Ballston more vibrant and attractive to people. This corridor is a great example of smart-growth planning “and the type of transit-oriented development that concentrates high-density, mixed-use development along a major transit corridor, while preserving and enhancing existing residential neighborhoods.”54 This project took years of planning, and citizens, staff, government officials, and developers were involved in the process. The project started because the Washington D.C. Metropolitan Area experienced significant growth around the 1960s, with people leaving Washington, D.C. for the suburbs. Planners needed to find a solution for all the demand in office space and housing in the area, so the TOD started. What it did to begin with was connect households with amenities such as jobs, schools, commerce and services through public transit, thus minimizing vehicle use.

“Arlington County is arguably the nation’s best TOD success story of the past 30 years. (...) Since the 1970s, it has also become an increasingly popular place to live, work, and shop due in part to high-density development along its Metrorail corridor.”\(^{55}\) These Metro corridors were located there because of the pressure that county officials and citizens applied to the planning commission of the Washington, D.C. Metro system. The original plan was to create the Metro line parallel to I-66, but with this pressure, the line was moved underground to service the Roslyn-Ballston corridor and create opportunities for private and public development.

It is interesting to note that the different stations in this corridor serve different major purposes, also it is also important to mention that all of them are high density areas with mixed land use development. “Roslyn, Ballston, and Crystal City serve as business centers; Court House has emerged as a governmental center; Pentagon City has become a regional shopping center; Clarendon functions as an ‘urban village’ with shops and restaurants; and Virginia Square has a cultural and educational focus.”\(^{56}\) This TOD development has attracted many people during its


existence, 26% of the 190,000 people living in Arlington County reside in this corridor, but it only takes 8% of the land area,\textsuperscript{57} which makes these stations a magnet for residential, commerce and office spaces, because of their high density planning and mixed-use, people don’t have to leave the area to find what they need.

But the most important benefit of this TOD, is that it has minimized vehicle trips considerably. Mixed land uses, pedestrian and bike friendly designs, and access to good and reliable public transit, are pillars to TOD. They also influence how people access the stations, for example, only one station in the Arlington County corridors has parking: East Falls Church Station, the others need to be accessed by foot or public transit. This reduces considerably vehicle use to access public transit, which at the same time reduces vehicle use in the area in general. “Metrorail ridership in Arlington has risen by over one-third – and additional 22,000 daily trips, since operations commenced in 1980. (...) Retail, office and residential development are Pentagon City gave rise to more than a three-fold increase in boardings since 1980. Other stations that attracted mid-rise, mixed-use development, notably Court House and Crystal City, also experienced appreciable ridership gains.”\textsuperscript{58} This is to show that higher densities and mixed land use development do reduce vehicle trips overall.

**Key findings for Bogotá:**

Bogotá can use the bull’s eye concept for creating a successful TOD in metro stations. This concept serves the purpose of concentration development and human activity in a small space that provides most of the amenities and necessities a person might need while being in proximity to a massive transit system that can transport them to other places within the city if needed.

\textsuperscript{57} Ibid.

Arlington County TOD corridor has a mixed-use development with high-density in the stations’ proximity that has allow the county to preserve and enhance existing residential neighborhoods while creating new housing options for people that want to enjoy the commodities of the area. It has also created affordable housing for the region, and although there is still a deficit for these types of homes, the County has a master plan and is working with local governments to cover this deficit and welcome more households with lower incomes.\(^\text{59}\)

Lack of housing in general is a big problem in Bogotá. Housing deficit is at 9%, with 3.8% needing immediate and important improvement and 5.2% that lack housing altogether.\(^\text{60}\) Creating more density in the stations’ adjacent areas, with an emphasis in affordable quality housing can reduce this gap. Bogotá has 125 informal settlements, mostly located on the periphery of the city, where around 230,000 people live.\(^\text{61}\) This is an enormous problem for Bogotá and is an impediment for social progress and upward mobility. Building new quality housing in denser areas near public transportation can improve many lives by giving people a dignified place to live, access to amenities, better schools, and efficient and quality transportation that will reduce travel times and open access to better jobs and opportunities.

Other important lesson that Bogotá con learn from Arlington County is that each of the stations inside the bull’s eye serves a different purpose while still maintaining the mixed-use character and high-density. These stations have mixed uses inside their area of influence, but there is a certain focus to each of them as explained above. Bogotá can replicate this model in certain stations and boost areas where this is already happening, like in the Calle 72 with Carrera 7, near


the Calle 72 and Caracas station, that already serves as a financial center for the city. The station, even if it is some blocks away, can increase financial institutions in the area, making the Calle 72 an even more important economic and financial corridor in the city.

![Figure 8: Calle 72 and Carrera 762](image)

Other important finding that Bogotá can replicate in its new fixed-rail system is the small amount of land used to create vibrant areas in a city. The bull’s eye TOD in Arlington houses 26% of the people living in the county but it only takes 8% of the land. Bogotá is growing, and it is growing fast, annexing adjacent municipalities and increasing its urban footprint each year. It is becoming a horizontal city that takes much more space than it should because vertical density is low. The proposed metro line does not count with high-density around the line and currently most of the buildings surrounding the project have a median of 2 to 4 floors, as shown in Figure 9. The construction of a new metro should be an opportunity to increase vertical density, reduce housing deficit, improve travel times, improve quality of life, and build a more equitable society. With a good TOD planning Bogotá can achieve all of this and more, including reducing single-vehicle trips and vehicle miles traveled (VMT).

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Figure 9: Proposed Metro line and block densities in Bogotá

Hong Kong

In Hong Kong, more than 68% of workers commute using MTR (Hong Kong Mass Transit Railway) or buses. Rail transit provide a faster and more comfortable service for passengers than any other mode of transportation in the city. It also makes transportation affordable for many low-income workers in the city, which gives them access to better jobs and amenities. TODs in Hong Kong are walkable areas around MTR stations, which come in different shapes and sizes. The city’s development is unparalleled to anywhere else in the world and its population continues to grow, but the city has limited space, and therefore it has grown vertically, and this makes it one of the densest cities in the world, with 16,983 people per square mile with one of the highest livability. For the city to provide for its residents, the public transportation system has been growing parallel to the urban development. The public rail system of Hong Kong is one of the most diverse and efficient rail systems in the world, becoming the city’s lifeblood.

Hong Kong’s MTR has an excellent financing system that can be replicated in Bogotá to create TOD and denser neighborhoods around the stations. It has “aggressively pursued transit value capture to finance railway infrastructure through its ‘Railway + Property’ development program, and more than half of all income to the railway operators comes from property development”. The MTR has also invested heavily on walkability and pedestrian quality, this has not only increased property values in the TOD areas but also ridership. Some stations with TOD average 35,000 more passengers on weekdays than stations that lack this approach.

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Key findings for Bogotá:

Hong Kong is one of the few cities in the world where public transit makes a profit. This is because the financing model for the whole system is innovative and has focused on walkability, accessibility, efficiency, punctuality, and other positive aspects that transit in other cities usually lack. It is also because it has used the TOD approach in most of its stations, increasing density and attracting people to live, work, and play in those areas. Bogotá, on the other hand, has not been very good at managing public transportation, an as was stated a couple of chapters back, the companies that manage the SITP are almost broke. The total investment needed for the first line of metro in the city add up to $13.88 billion 2018-2022 dollars. This will be divided between the national government which will contribute with 70% and the city which will add the other 30%.

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70 Ibid.
Some of this money will come from loans made by the Inter-American Development Bank and the World Bank\(^72\), but there is no plan to create TOD near the stations, and developers are not being included in negotiations. It looks like, as in the case with TransMilenio the city will let the market work alone. My recommendation is that the city needs to make a plan in which developers and private companies can invest in certain lots of land for immediate or future development. Also, with more density and better urban planning, the city can collect on revenue created by transit value capture to better finance the rail system, build more metro lines with TOD near the stations, and continue improving public transportation in the city.

Other important lesson that Bogotá can learn from Hong Kong is the creation of the “Rail + Property” development program. Density and better urban planning, the city can collect on revenue created by transit value capture to better finance the rail system, build more metro lines with TOD near the stations, and continue improving public transportation in the city.

\(^73\) The changes in legislation for the metro in Bogotá to operate haven’t passed yet, so this is an incredible opportunity to include a clause giving powers to the Metro Company to cash on these property-value increases. This way, Metro can be self-sustainable, without the need for taxpayer subsidies. Bogotá can create a similar model to the “Rail + Property” that operates in Hong Kong, and the city can provide new rail lines (in this case Bogotá can start doing it from the first line) with development rights for land on and near metro stations. For this, the city will have to buy these rights first, which will mean an enormous capital investment, and for the city an enormous challenge, but it is an excellent business model in the long-term that will save the city and its taxpayers millions, possibly billions of dollars in the long-run. After providing Metro with the


development rights, “the MTR pays the government a land premium based on the land’s market value without the railway”,74 this way the city will see some return on its initial investment.

But Hong Kong’s model doesn’t stop there, and it has more lessons learned that Bogotá could use in the development of its first metro line. After paying the city government the land premium, the MTR builds the fixed-rail line and also partners with private developers to build adjacent properties, something that is lacking in Bogotá’s plan at the moment.

The choice of private developer is made through a competitive tender process. MTR receives a share of the profits that developers make from these properties; this share could be a percentage of total development profits, a fixed lump sum, or a portion of commercial properties built on site. By capturing part of the value of the land and property around railway lines, MTR generates funds for new projects as well as for operations and maintenance (…) Revenues from R+P developments above stations along MTR’s Tseung Kwan O line, for example, financed the extension of that line to serve a new town, which has since grown to a population of 380,000.75

Other lesson from Hong Kong to Bogotá, is that the MTR, by using its power over the land surrounding its stations, has created vibrant, walkable, and mixed-use spaces, where people can live, work, and play they need without having to leave the area. Also, it has created high-densities, maximizing the amount of residential, business and leisure space within walking distance of public transit. Hong Kong is one of the best examples of TOD in the world, and Bogotá should look to it before putting the first stone on the ground for metro.

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75 Ibid.
URBAN PLANNING AND TRANSPORTATION

This new chapter doesn’t focus just on TOD but on how urban renewal can transform a city, and specially how innovative mobility solutions can give everyone more opportunities, transform cities, and create more walkable and people friendly areas. The case study used for this chapter is the city of Medellín, which makes a good comparison to Bogotá because Medellín is the second largest city in Colombia, with a smaller budget and with extreme social problems, that have transformed using urban planning and transportation improvements.

Urban Renewal and Transportation in Medellín

Medellín doesn’t have TOD per se, but it is a city that was able to transform itself and become one of the most innovative cities in the world, an example in urban planning, and has made changes in urban public transit to close the social gap in one of the countries with the highest inequality in the world (fourth in Latin America and the Caribbean and twelfth in the world). For these reasons I will include Medellín as one of the cities from which Bogotá can learn important urban renewal and planning, transportation, sustainability, and civic culture lessons that will improve planning for metro and its areas of influence.

“The city of Medellín has transformed through the execution of urban-scale projects that have significantly modified its territory through the generation of public space, new equipment, and the bet to create sustainable public transport systems. These actions are derived from a land use model in force since 1999”.

Using urban planning, Medellín has not only significantly improved its public transit, but it has also tackled pressing urban problems like uncontrolled urban expansion or violence. Its transformation has been incredible, amazing, fascinating, awesome, wonderful, and all synonyms to these words you can find. Innumerable articles have been written about the city’s transformation, and some academic papers too, although the fact that the city is in South America and not in the United States or Europe, where research has more strength, means that not enough enquiry has been made in this field.

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Figure 12: Urban projects and improvements in Medellín (Many of them were built in the neighborhoods that have been traditionally left behind)\textsuperscript{80}

“At one point, Medellín was the most dangerous city on earth. From 1990 to 1993, more than 6,000 people were murdered annually, and not just in the slums. Drive-by-shooting was regular and indiscriminate (...) The need for change was urgent – and perhaps only such extreme conditions could have led to such radical urban experimentation”.\textsuperscript{81} The city has found innovative ways to connect residents from marginalized mountainside neighborhoods (called Comunas) to better jobs, schools, and amenities. For example, Medellín has a network of cable cars, Metrocable, and giant outdoors escalators that make access and commuting easier for most of the 2.5 million people that live in these areas.\textsuperscript{82}

\textsuperscript{80} Ibid.
The city’s leaders recognized that violence and inequality needed to end in the city, so they started a series of programs and interventions to rebuild the social fabric of the city. “The city’s planners began addressing its endemic violence and inequity through the design of public spaces, transit infrastructure, and urban interventions into the comunas.”

The social fabric was certainly restored in great part, and although violence still happens in certain areas of the city (violence that has its context in the complicated history of Colombia), the change has been astonishing.

Medellín counts with the most advanced public transit system in the country. The city has achieved the integration of its public transit modes, something that Bogotá tried to do but still hasn’t implemented correctly. It reaches most of the city and focuses on people using public transit

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and bicycles instead of cars. It has: metro, Metroplus (BRT), Metrocable (gondola), streetcar, buses, and designated lanes for bicycles.

The Medellín Metro system consists of: 2 fixed-rail lines that have 27 stations in total. 4 Metrocable lines with a total of 12 stations. 2 Metroplus trunk roads with 27 stations. 1 Tram line with 11 stations, and 200 Metro buses to feed the metro.

The history of the metro is important, because it was designed to connect low-income household to the city and to give them a better quality of life by providing an affordable transit system. “The Metro was envisioned as a massive urban transport system for the worker classes of the city. Furthermore, it was also seen as an important cultural symbol that would also help to develop marginalized and poor areas of the city”. 84

Other important feature of Medellín’s metro is civic culture. The metro even has a program to educate citizens about civic culture, which has been a great success. “Metro Culture is understood as the result of a management, social, educational, and cultural model that Metro has built, consolidated, and gift to the city (…) Starting in 1988, the Company set out to create a new culture among the citizens of Medellín, consolidating relations of trust with the people who at that time will be future neighbors of the stations and lines to generate a sense of belonging and an attitude of care and preservation of the transport system”. 85

Some metro stations have art galleries where people can enjoy the work of different artists, democratizing art and culture in the city. Metro also publishes books called “Palabras Rodantes” (Rolling Words) to incentivize reading in its users. Speaking of books, 4 stations have libraries

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with more than 10,000 books and with free access to internet. It is an accessible and inclusive system that works for all, including people with disabilities.86

Figure 14: Downtown Medellín and Metro.87

86 Ibid.
AVOIDING GENTRIFICATION AND DISPLACEMENT

Gentrification “is the transition of a community from low-income or working-class status to middle-class or affluent status, largely through in-migration. It starts by defining the demographic composition of a city at a fixed time, and documenting changes from that time.” 88 The problem that has arisen with this word is not gentrification itself but the displacement of poorer residents it creates. In most cases these words are used as interchangeable, but it is not the case. Gentrification, or better yet, urban renovation, may lead to displacement, but displacement can be caused by multiple factors that have nothing to do with urban renovation.

The first part of the definition is actually good for cities because blighted or deteriorating areas of the city, such as a neighborhood, are repaired, renovated, and redeveloped to created communities with more amenities, better sidewalks, better homes, and in all, a better quality of life for residents. The fact that middle and upper-class people want to move into these neighborhoods isn’t a problem either, or shouldn’t be a problem, if this renewal is done in the right way, thinking of existing residents and business owners that have lived in the area for some time. They too should be able to enjoy the betterment of their neighborhood and take advantage of the returns this creates, such as increase in land value, safety, improved parks and sidewalks, access to better school, jobs, entertainment, restaurants, and supermarkets.

So, how to do urban renovation without the displacement part of the process. It is not an easy task, but most of this displacement can be avoided with some strategies and that cities can pass. For example, inclusionary zoning, private schools providing scholarships, programs so that renters can buy their homes and enjoy the increase in land prices, amongst others. This is especially

important in a TOD area where property prices might go up fast, and where most of the single-family housing will be turned into high density mixed-use buildings. Especially, in Bogotá, where there’s a culture of classism and a society divided by strata and income. If done right, TOD in the metro stations can help the change begin and create more diverse and equal communities in the city.

I will explain these strategies and use lessons learned in the next chapter where I will give my recommendations for the creation of TOD in the future Bogotá’s metro stations. Some of these stations will be located in poor areas of the city, but with better access to quality transit some of these areas will be gentrified and people might be displaced. With the right strategy displacement can be avoided and the metro can bring a better future for all.

**Inclusionary zoning**

Inclusionary zoning is a good way to ensure that there is a diversity of incomes in a neighborhood. It “stipulates that new residential developments have to have a certain number of apartments or condos, which are then deemed ‘affordable’, where the rent or the selling price is lower than the market rate and that are only available to people whose incomes fall below a certain level”.

This change in zoning could benefit thousands of people in Bogotá, especially people that will see their housing situation threatened by the new metro.

The city government can give it a twist and give priority for the new affordable units to existing residents of the area. This way they don’t have to move, they can enjoy the new amenities of the neighborhood, and communities won’t be broken. This will also help avoid displacement, and since most of the adjacent blocks to the proposed metro stations are low density (the TOD will

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change them to mixed-use, high-density areas), having 10% to 15% units of affordable housing in each new building can cover most of the demand from existing residents that might be displaced, giving them a new and improved home in a renovated neighborhood.

Since these units cost money to developers because they can sell or rent them at market place, cities like Washington, D.C., “incentivize inclusionary zoning development by allowing developers in inclusionary zones to build a 20% larger building than would normally be allowed for that particular zone”\(^90\), or in other words, the city gives developers bonus density for their projects.

**One-on-one replacement for lower-income dwelling units**

In the United States, the U.S. Department of Housing and Urban Development (HUD) has a program to replace low-income housing that is demolished or converted for uses other that low-income dwelling units with another unit for the tenants. The law states, under section 104(d) of the Housing and Community Development Act of 1974 that “All occupied and vacant occupiable lower-income dwelling units that are demolished or converted to a use other than as lower-income dwelling units in connection with an assisted activity must be replaced with comparable lower-income dwelling units”\(^91\).

The one-on-one replacement has many provisions that stipulate which housing is appropriate for this replacement. It states that replacement housing can be provided by any government agency or by a private developer. It also stipulates that the replacement unit must be located within the recipient’s neighborhood, making it easier to keep communities together and


\(^{91}\) “24 CFR 42.375 - One-for-One Replacement of Lower-Income Dwelling Units.” n.d. LII / Legal Information Institute. Legal Information Institute. [https://www.law.cornell.edu/cfr/text/24/42.375](https://www.law.cornell.edu/cfr/text/24/42.375).
permitting existing residents to find a new home without being displaced of their neighborhood. The units also must be able to accommodate no less than the number of previous occupants and must have a similar size. They also have to be good quality housing and they have to be designed to remain low-income dwelling units for at least 10 years to the date of the initial occupancy. This one-on-one replacement for low-income housing can be a good way for Bogotá to avoid displacement in the areas that will be converted to mixed-use high-density developments and that are located near metro stations. The city can rehouse people in near their original homes while the development is taking place, and once it is ready rehouse them to their new permanent homes in the new developments.

**Programs for home ownership**

The United States government has different programs for people with low-income to buy homes. In Colombia such programs exist as well, but they are not as well developed or available for a broader population as in the United States. For this reason, I’m going to use the United States example for programs that the Government of Colombia and the city government of Bogotá can create and use to avoid displacement in TOD areas.

**FHA Loans for First-Time Homebuyers**

The Federal Housing Administration (FHA), under HUD, insures mortgages. This makes it easier for would be new homeowners to afford bank loans. The FHA also has the power to offer HUD homes for sale, which permits first time homebuyers to look for affordable housing.

**Homeownership Vouchers**

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This program gives low-income families and residents that live in public housing and that are first-time homebuyers with subsidies that they can use to buy a home. It is managed by local Public Housing Agencies (PHA). In Bogotá these subsidies can be offered not only to people who live in public housing but also to low-income people that live in the future TOD area of influence. This can avoid displacement, increase the homeowners pool in the city, and also give people a chance to sell their homes when land values have risen due to the TOD and proximity to a quality mass public transit system.93

Programs for Rural Residents

These programs are available in the United States through the Local Rural Development (RD) offices around the country and provide information on single-family housing programs for rural residents. Although this is a laudable idea, I’d propose some mayor changes if it were to be implemented in Bogotá.

Since this paper is about urban planning and specifically to planning TOD in the proposed new stations for the metro of Bogotá, I propose creating a Program for People Displaced from their Rural Homes. Colombia has a complicated history and a more than complicated relationship with violence. The reality is that for many years rural communities were displaced by violence and made to flee to cities, mostly Bogotá. Millions of people suffered this fate, and although the Peace Accords brought an end to a 50-year war, in lesser measure, some rural communities are still suffering from this violence and flock to Bogotá for safety. These people usually don’t have a place to stay, much less a place to live. They arrive in the city with what they are wearing and sometimes a bag with their most valued possessions. These people need a place to live and to lead a dignified life, so they can heal from their horrible ordeal.

I propose that the city partners with developers that are interested in building in the TOD area to create quality homes for these people. If developers comply, the city can award them with another 20% up zoning in their TOD buildings, like when they build affordable housing under inclusionary zoning. This will give developers incentives to comply and provide quality housing to displaced people. These homes don’t need to be inside the TOD areas. The city will previously identify areas and neighborhoods that would provide a good quality of living for the newcomers and let the developers build there, while giving them a premium density bonus of an extra 20% on the TOD site.
A NEW TOD FRAMEWORK FOR BOGOTÁ:

RECOMMENDATIONS AND CONCLUSIONS

There is no current plant to implement a TOD approach near the proposed new metro stations in Bogotá. After reviewing the literature and analyzing successful examples, my recommendations are that TOD should be implemented since the beginning and the financial side of Metro be revised to include public-private partnerships (PPP), transit value capture, and the financial back muscle of the private sector.

In this chapter I will summarize the lessons that Bogotá can learn from other successful TOD examples and urban development. These were analyzed thoroughly in the paper and each lesson was explained in ways that can be implemented in Bogotá.

The first and most important recommendation is: build the new metro stations using a TOD approach. This is my main recommendation and the conclusion to this paper. TOD is an approach that can change the city in a good way and stop sprawl, creating healthier communities and benefiting everyone in the city. TOD will bring innumerable benefits to the city and will improve the urban landscape. The construction of a new metro should be an opportunity to increase vertical density, reduce the housing deficit, improve travel times, improve quality of life, and above all else build a more equitable society. For TOD to work in Bogotá a strategy needs to be put in place by the city to articulate stations with better sidewalks, mixed-use and high-density development, providing first and last mile mobility solutions, and incorporating vibrant public spaces into the TOD to create and enhance public belonging and community involvement.

Also, keep building and promoting TransMilenio, a city as big as Bogotá needs multiple modes of public transportation to be efficient, increase productivity, and for the demand to equal the supply of costumers. Connecting people, and making it with good, reliable, fast, and quality
service must be a priority for the city. But most importantly, don’t make TransMilenio and Metro compete for ridership and revenue by building lines and trunk lanes in the same roads. This way one or both systems will lose ridership and revenue, and they will not serve as complementary services, making it a disservice to the city and its citizens.

Use PPP to finance the metro system and do this since the first line in which construction hasn’t begin. This way, the private sector will chip in and contribute to a system that will benefit their employees and their productivity. These partnerships will also remove some of the cost burden from the city and taxpayers. Metro can also create a similar program to “Rail + Property” development program in Hong Kong where the city gives development rights to metro and metro partners with developers to build and collects revenue through transit value capture. This is an excellent financial model that Bogotá could implement because, if done right, Bogotá’s metro can join the MTR in being one of the few transit systems in the world that makes a profit.

Other excellent funding and revenue source for metro and TOD in its areas of influence can be land value capture. This mechanism “permits governments to recover part of the increase in value of urban land, as a result of the development of public projects. The sector public uses the recovered value to cover a part, or all, of the project investment, for example of a new transport corridor public. This modality, in addition to providing resources for the provision of infrastructure transport, promotes social equity, since the wealth that is generated by affecting the values of soil thanks to the infrastructure is shared by the public”.

In Washington, D.C., Washington Metropolitan Area Transit Authority (WMATA), uses land value capture as part of metro financing. WMATA has incorporated private developers that contribute with some capital and operating costs of the system. “What makes the WMATA case interesting is their use of several approaches of joint development. To generate higher income and to receive contributions from private investors for station construction costs, they offer property for residential, retail and commercial activity and development near and above stations. Moreover, they sell and lease land, as well as air rights. The amount of revenue WMATA collects from its decisions confirms the success of the project. The joint development projects had generated over $60 million by 1999. By 2003 it was estimated to increase to $150 million”.  

A TOD approach in Bogotá can concentrate human activity in small amounts of land by using high-vertical-density, mixed-use development, and creating affordable housing in areas that will thrive and be vibrant communities and neighborhoods, thus breaking the classism and inequality cycle in the city. These TOD places will create safe, well-lit, walkable, mixed-use communities, that will use urban planning, landscaping, and quality transit to combat violence, unsafety, classism, and inequality in the city, by providing a sense of community. To do this, Bogotá can implement a similar civic culture strategy as the one implemented in Medellín where people finally understood that public services and resources are for all and needed to be respected. Also, an important lesson that Bogotá can learn from Medellín and implement with the new metro is creating a quality integrated transit system, and not just on tariffs, as is the case with Bogotá, but in routes, times, quality, schedules, amongst others.

Finally, and most importantly, TOD will give a chance to Bogotá to correct historic mistakes that have led to inequality and displacement of the poor to periphery areas of the city. This can be made using legal strategies such as inclusionary zoning, that will also tackle classism, one-on-one replacement unit programs for low-income households living along the metro line and near the stations where the TOD will be developed that will give people a quality and dignified house of their own. Creating home ownership program directed at people that will see their housing situation affected by metro and creating a rural displacement housing program that will give developers bonus density in their TOD buildings if they build quality housing for displaced people from the country in places previously designated by the city.

TOD will permit a most needed urban renewal in Bogotá and will improve quality of life for millions of people depending on transit to move around the city. Bogotá has a unique opportunity to improve public services, and with some help with the private sector, and some political will, this can be done in just a few years.

Conclusions:

TOD should be implemented in Bogotá to combat sprawl, create better neighborhoods, fight inequality, and to create vibrant mixed-use neighborhoods. The implementation of this approach into the future metro stations will reduce single-occupant vehicle trips, car ownership, and car dependence in a city where people see cars as a class status. If car ownership became more difficult, and by reducing access to cars in the TOD, people will use metro and other public transit modes to mode around, creating a more democratic society.

There are multiple financing options to implement this approach, and Bogotá should look into all of them to create a financing mechanism that will not only permit it to build TOD around stations but to create a public transit system that has profits every year, like MTR in Hong Kong.
With political will and with the right planning and support from developers Bogotá can transform into one of the most competitive cities in the region and set the example for future transit developments in the world.

![Sunset in Bogotá](image)

Figure 15: Sunset in Bogotá

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BIBLIOGRAPHY AND SOURCES

24. According to geopath, mass transit transportation are public conveyances such as buses, trains, subways and other rapid transit commuter systems. https://geopath.org/transit-glossary/.


