LAC Cities Study Tour, Brazil Chapter
Sector Notes: Urban Mobility

African Development Bank (AfDB)
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Disclaimer

This document was prepared as part of the series of sector notes that highlight the characteristics of the particular urban infrastructure sector, the roles of the private and public sector, and the financing mechanisms for the long-term funding of these urban interventions. The notes are prepared as background material for the Latin American and the Caribbean (LAC) Cities Study Tour offered to African Cities in the UMDF Cities Program. The sector note also highlights the experiences of the LAC region in finding solutions for the urban challenges as well as the lessons learned. The notes were prepared on the basis of the experiences of the Inter-American Development Bank (IADB) with its Emerging and Sustainable Cities Initiative (ESCI) from 2012 thru 2017. The sector note also benefited from consultations and recent work by development financial institutions and academic institutions in the sector.

This work is a product of an external consultants group led by Ellis J. Juan (former Urban Division Chief at the Inter-American Development Bank) with external contributions. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of the African Development Bank, its Board of Executive Directors, or the governments they represent. The African Development Bank does not guarantee the accuracy, completeness, or currency of the data included in this work and does not assume responsibility for any errors, omissions, or discrepancies in the information, or liability with respect to the use of or failure to use the information, methods, processes, or conclusions set forth.

October 24th, 2023

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Executive Summary

At the core of adequate urban planning leading to dignified standards of quality of life within a sustainable development path, lies the need for efficient and just access to urban mobility. The ways and which we mobilize ourselves within the context of an urban space, influences relevant variables that impact our well-being such as congestion, pollution, public health, cost of doing business, informality patterns, social behavior, fiscal sustainability and the shape and form of a city. The planning of both public and private urban transportation within an urban cluster is fully integrated with the long-term urban planning process and its climate change strategy. Irregular and disorganized public and private transportation planning strongly impacts cities' capacities to offer a livable habitat for its citizens, with extreme consequences in the provision of public goods such as access to jobs, public health, public spaces, and efficient mobilization.

Additionally, one of the important economic features of the urban mobility sector is that efficient public transportation requires large upfront investments in capital equipment and suitable infrastructure, coupled with periodic maintenance and rehabilitation (i.e., subways, trams, light rail, BRTs, cable cars, etc.). Because the services provided by public transportation caters primarily to consumers distributed across the wide spectrum of socio-economic groups, the end-user's tariffs do not reflect the full cost of providing the services, impacting the public finances of a municipality or a metropolitan area. This difference between the end-user tariff and full cost tariff provision is known as the affordability risk. In developing economies, this affordability risk is more acute, fiscal space more restricted and income per capita lower. Not only is the upfront investments higher for efficient public transportation but more difficult to recover in developing economies, leading to higher demand for public transfers (i.e., subsidies), that when they are not met, transform into lack of maintenance, rehabilitation, and expansion, impacting quality of service and propensity to pay a higher tariff by the end-user. This type of circularity is also known as the "vicious circle" of infrastructure development.

Latin America and the Caribbean (LAC) experienced very rapid urbanization rates in the decades between 1960 and 2000. These relatively high urbanization rates made it very difficult for the cities in LAC to adequately plan the public and private transportation modes to adapt to the urban footprint expansion. Consequences of the disparity between the high urbanization rates and the lack of urban mobility planning coupled with limited fiscal space, are well known, and documented in LAC cities as this sector note attempts to illustrate. For the most part LAC cities have experienced all the negative consequences of inadequate urban mobility (i.e., impact on congestion, pollution, health, informality, etc.). Adding complexity to the search for urban solutions to these challenges, LAC cities have been successful in reducing poverty levels[1]. Reducing poverty at city level has two important impacts on urban mobility: (a) it increases rural – urban migration (better job opportunities), and (b) one of the first empowerment symbols for citizens leaving poverty is to acquire a used personal vehicle (i.e., motorcycle or car). Both factors (i.e., added population and added used polluting private car fleet), increase all the undesired consequences of inefficient urban mobility.

LAC Cities have many shortcomings in the urban mobility and urban planning approach. Many mistakes have been made, but also some relatively efficient mobility solutions have been found and have been well executed. African cities can draw valuable insights from LAC cities, which

1 Extreme poverty headcount levels (i.e., people living on less than US$ .25 a day), have halved in LAC between 1980's and 2010 from 12% to 6%. World Bank, Poverty Reduction and Equity Department, 2012

have successfully implemented innovative transportation solutions to enhance mobility while keeping environmental and fiscal sustainability standards. This knowledge transfer can offer adaptable strategies for African urban areas that are set to undergo similar growth rates in the coming decades. Establishing technical assistance programs and fostering partnerships between Latin American and African cities are crucial for addressing transportation challenges effectively.

LAC cities have pioneered various transportation modes and solutions to tackle these challenges, such as Bus Rapid Transit (BRT) systems, electric transport systems, cable car systems, bicycle systems, and water transportation systems (i.e., rivers, lakes, shoreline). Notably, the Sao Paulo Metro in Brazil, the BRT TransMilenio in Bogotá, Colombia, the Cable Car in Medellin, Colombia, and La Paz, Bolivia, and the electric bus initiative in Santiago de Chile are among many of the urban mobility solutions showcased in the note. The lessons learned from the implementation of these urban mobility solutions targeting the lower income segments of the end-user while using innovative investment approaches that can accommodate the available fiscal space while minimizing environmental impact, can guide African cities in developing tailored made solutions to meet their own challenges.

The success stories from LAC underscore the importance of innovation, sustainability, and integration within a larger transportation framework in addressing urban mobility and enhancing the overall quality of life for residents. Implementing similar strategies in African cities holds significant promise for achieving sustainable and efficient urban transportation systems, paving the way for a better future. Public Private Partnerships have in general been successful in LAC cities, and their experiences have demonstrated important lessons such as: (i) a priori definition of the roles of the public and private sector, (ii) the underlying economic regulation governing the PPP mechanisms (i.e., end user tariffs, payment for service, cost adjustments mechanisms, remedies and conflict resolution), (iii) addressing environmental, social and governance standards, (iv) procurement processes, (v) risk management framework for concession and other types of public service contracts, and (vi) strong communication strategy with the key stakeholders in the process (i.e., end-users, academic institutions, media, NGOs, and political institutions)

Long-term financing mechanisms are challenging to structure in urban mobility, given the relatively high upfront investment costs and the presence of relevant affordability risks requiring strong subsidies. An adequate blend of public and private financing mechanisms have provided the best financially sustainable solutions. In this context, development financial institutions (DFIs) can play an important role in supporting the development and promoting favorable conditions to attract private investment. Offering project preparation assistance and helping to close financing gaps. They have a unique advantage and capacity to interact directly with both the public and private sectors. The African Development Bank (AfDB) has a critical role in financing urban mobility projects across African cities. They provide financial support, technical expertise, and policy guidance to address the continent's infrastructure needs. The AfDB, through both its sovereign and non-sovereign window can deploy financing products to fund the public sector and to mobilize private capital for urban mobility solutions.

As previously mentioned, LAC cities have experienced decades of very strong urbanization growth without the tools to adequately plan for such urban expansion, and for the most part, with limited fiscal space to finance the provision of efficient urban mobility services. LAC cities experience the consequences of such rapid urbanization, and it is represented today via important costs to society (i.e., congestion, pollution, informality, cost of doing business, insecurity, etc.), and diminishing standards of quality of life and social justice. Within these lessons, there are many positive experiences that led to the development of innovative urban mobility solutions. We hope the African cities will be able to develop important positive learning from the analysis and exposure to the LAC experience.

Background

Urban clusters (Cities) are a result of the special advantages to carry out economic activities in its proximity, these advantages are referred to as the “economies of agglomeration” because production and service costs tend to be lower when certain groups of activities are located close to each other. Transportation costs are a significant component of the production costs in a world where communication costs (i.e., ICT) are going down, Proximity reduces transportation costs (i.e., costs of providing the service including replacement costs, congestion costs, pollution costs, and technology adaptation costs). When the urban footprint of these clusters (cities) increases in a disorganized way due to rapid and unplanned urbanization, transportation costs instead of decreasing, exploiting the benefits of agglomeration, tend to increase creating an extraordinary burden in the cost of doing business, and in the public finances of municipalities[(2)].

More than half the people on earth now live in cities, and this share will grow to 60 percent by 2030. In developing countries, cities function as powerful engines of economic growth and poverty alleviation. At the same time, rapid urbanization is exerting pressure on all urban systems and services. The world’s cities occupy just 3 percent of its landmass, but account for more than 60 percent of energy consumption and 75 percent of carbon emissions[(3)].

As cities grow, African cities are facing a myriad of transportation challenges that demand innovative solutions. Learning from the experiences of Latin American cities is essential as they have confronted similar urbanization pressures, although at different scales and intensities, and have successfully implemented innovative transportation solutions that have significantly improved mobility, reduced congestion, and contributed to sustainable development. By drawing from Latin American experiences, African cities can adapt proven strategies to improve their transportation systems, reduce congestion, and create sustainable urban mobility, as they seek practical and adaptable approaches to transform their transportation sectors.

Due to LAC’s broad experience, as well as the already existing strong ties between both regions, a cities exchange would have the goal of developing a technical assistance program between the cities of both regions to create a space for knowledge transfer. The development of these opportunities can bring important solutions to daily challenges in managing cities in Africa, stimulating future strategic partnerships between municipalities and the private sector in both regions.

2 Review of Public Transportation Economics, Horsher-Tirachini, January 2021. Urban Transportation Economics, Kenneth Small, 2007, and author’s own analysis.

3 Mobile Metropolises, World Bank, IEG, 2017

This sector note focuses exclusively on the urban mobility challenges faced by cities in emerging markets that are experiencing rapid urbanization. The present note focuses on the urban mobility experiences in the Latin America and Caribbean region (i.e., second highest urbanized continent in the world with four out of five persons living in Cities), the urban solutions developed for such challenges, and how these lessons learned could be of use for African Cities that will be experiencing similar urbanization growth rates in the next three to four decades[4].

For purposes of this sector note, urban mobility involves three broad categories of collective (i.e., public transportation), individual (i.e., cars, motorcycles, bikes, walkability, etc.), and freight transportation (i.e., trucks, and to some extent, urban trains). While the mobility of passengers is the outcome of individual decisions based on different rationales, freight mobility is decided in tandem between the cargo owners and transportation service providers[5]. Urban areas are the most complex settings in which the mobility of passengers and freight is taking place. Typical urban attributes such as density, diverse economic, cultural, political, and social functions, and land scarcity, jointly generate mobility demands and constraints. In several instances, the mobility of passengers and freight is complementary as they may be using separate routes. Still, both are competing for the usage of scarce land and transport infrastructures.

Box No. 1: Urban Mobility and the Sustainable Development Goal

Mobility and accessibility are deteriorating in most cities because increasing motorization overwhelms the system, with negative effects on urban structure, health, and safety, and with serious implications for the welfare of the urban poor and the effective functioning of cities. Urban transport can provide arteries for movement of people and goods for efficient, sustainable cities. It can connect the urban poor, women, and persons with disabilities to labor markets, public services, and markets, facilitating achievement of the twin goals of eliminating extreme poverty and achieving shared prosperity. With planning and investment in public transit, integrated services and ticketing can improve its affordability and convenience so that the poor and disadvantaged can manage their often more complex travel. Well managed urban transport can also help address congestion, pollution, safety, security, unplanned growth, and other critical concerns. The value of urban transport is affirmed in the 2015 Sustainable Development sub-goal 11.2: “By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.”

Source: World Bank, Mobile Metropolises, IEG, 2017

4 Latin America and the Caribbean (LAC) started its urbanization transition in 1950 and is now the second most urbanized region in the world, with about 4 out of 5 people living in cities (UNDP, 2018). Urbanization in Africa is also progressing rapidly. Between 1960 and 2010, the percentage of inhabitants living in African cities increased from 15% to 40%, and the region’s urban population is expected to triple in the next five decades with a significant representation of its youngest residents.

5 **(a) Collective Transportation (public transit)**. The purpose of collective transportation is to provide publicly accessible mobility over specific parts of a city. The systems are usually owned and operated by an agency, and access is open to all as long as a fare is paid; the reason why they are called public transit. The efficiency of public transit systems is based upon transporting large numbers of people and achieving economies of scale. It mainly includes tramways, buses, trains, subways, and ferries. (b) **Individual Transportation**. Includes any mode where mobility results from a personal choice and means, such as the automobile, walking, cycling, or motorcycling. Most people walk to satisfy their basic mobility, but this number varies according to the urban context. Some forms of individual mobility could be favored, while others could be impaired. For instance, walking accounts for 88% of all movements within Tokyo’s central area, while this figure is only 3% for Los Angeles. The density and design of the former are more accommodating to the mobility of pedestrians than the latter. (c) **Freight Transportation**. Since cities are dominant centers of production and consumption, urban activities are accompanied by large freight movements. These movements are characterized mainly by delivery trucks moving between industries, distribution centers, warehouses, and retail activities, including major terminals such as ports, railyards, distribution centers, and airports. The growth of e-commerce has been associated with increased home deliveries of parcels. The mobility of freight within cities is part of an emerging field related to city logistics. A Geography of Transport Systems, Urban Mobility and its Evolution, Jean-Paul Rodrigue, 2020

Experience from LAC

Mobility has become one of the primary challenges for local public administrations. Currently, transportation represents 20% of global energy demand and contributes to 40% of CO2 emissions in LAC. Projections indicate that energy consumption and CO2 emissions linked to transportation in the Region could rise by nearly 50% by 2030 and exceed 80% by 2050.[2] Considering these factors, and the lack of effective planning, cities in the region have grappled with inefficient public transportation services, heightened levels of traffic, noise, pollution, and a decline in competitiveness. These challenges have stimulated the adoption of innovative solutions and fostered collaboration among public, private, civil society, and academic stakeholders to enhance citizen mobility.

Latin America hosts a series of transportation modes, including roads, railways, ports, airports, and public transit systems, that plays a crucial role in regional and international connectivity, facilitating trade, tourism, and economic growth in the region. LAC cities have developed Bus Rapid Transit (BRT) systems, investments in cycling infrastructure, or the engagement of the private sector in transportation provision, to face the daily sector challenges, such as traffic congestion, insufficient infrastructure investment, road safety concerns, and environmental sustainability issues. In this context, it is essential to analyze the dynamic of the transport sector in Latin America and these experiences to tailor strategies that suit African cities' unique contexts.

LAC Region has the world's fastest-growing motorization rate, at approximately 4.5 percent annually. And projections indicate that it will triple over the next 25 years, resulting in an increase of over 200 million vehicles by 2050.[3] Also, the Region has the highest use of public buses per capita in the world. In some cities like Quito and Bogotá, around 50% of daily passenger trips rely on public transportation. However, in other cities such as Mexico City and Panama City, public transportation accounts for as much as 70% of passenger journeys on an average workday.[4]

Nevertheless, as the middle class continues to expand and more individuals enjoy greater purchasing capacity, there is a noticeable growth in motorization rates and the volume number of automobiles in circulation in cities across the region. This trend and sense of empowerment that accompanies vehicle ownership, leads to higher levels of urban congestion, emissions, and air quality and noise-related issues. In Mexico City the motorization rate surged from 308 vehicles to 593 vehicles per 1,000 inhabitants between 2005 and 2015. Over the same period, the number of registered vehicles doubled to reach 4.9 million. Projections indicate that by 2030, Mexico and Brazil will be represented 5% of global vehicle sales.[5]

Metro Systems

Metro systems play a crucial role in the transportation landscape of LAC Region, addressing the challenges posed by rapid urbanization and population growth. These underground and elevated railway networks are vital in easing traffic congestion, reducing air pollution, and providing a more efficient means of public transportation for millions of people.

Also, metro systems are critical in increasing connectivity, reducing travel times, and restraining the environmental impact of excessive road traffic. Moreover, they contribute to economic development by efficiently transporting people to business hubs, educational institutions, and other essential areas, fostering growth and urban development. It should also be recognized that the effective implementation of mass transit systems, such as the Metro, demands: (i) important economies of scale, and (ii) robust fiscal resource availability. It is not an "executable" solution for all large cities and metropolitan areas.

In Latin America, there are nineteen cities that have metro systems, making it the third-largest region with such transportation (following Asia-Pacific and Europe). The total length of metro lines in these cities is 943 kilometers, including 780 stations and 9 thousand train cars. While these numbers might seem smaller than Europe's extensive 2,921-kilometer network with 25.8 thousand train cars or North America's 1,544 kilometers with 14.2 thousand train cars, Latin America shines in terms of the number of people using the metro. Every year, almost 6.000 passengers use these metro systems, which is more than the annual ridership in North America (3.700 passengers annually). This indicates a strong reliance on public transportation in the region.[6]

A notable example is the São Paulo Metro in Brazil. Inaugurated in 1974 this metro system has been a transformative solution owned by the State of São Paulo and most of the lines operated by Companhia Do Metropolitano De São Paulo (São Paulo Subway Company). It is the largest system in South America and the second largest in Latin America, behind the Mexico City Metro. Covering a vast network and carrying millions of passengers daily, it has significantly improved the city's transportation efficiency, reduced traffic-related stress, and enhanced urban sustainability. The São Paulo metro system covers 104.4 km within the Companhia do Metropolitano de São Paulo (CMSP) and a total of 377 km across the entire network. The system is served by 91 stations within the (CMSP), and the complete network comprises 187 stations.

The fare system in the São Paulo metro is based on an integrated fare structure that depends on the number of trips a user takes and the areas they traverse. The ticket cost is determined by the distance traveled and is paid using a rechargeable card called «Bilhete Único,» which could be used not only for the metro but also for other means of transportation in the city, such as buses and commuter trains. The fare system is designed to be fair and accessible to different segments of the population, with differentiated fares for students, seniors, and people with disabilities. This fare system contributes to the financing and sustainability of the metro and the transportation system.

6 file:///C:/Users/mariza/Downloads/Germany,%20Bonn,%20Jauregui-Fung_Introduction_to_sustainable_public_transport_solutions_in_Latin_America,%202022.pdf

Figure No. 1: Metro Systems in Sao Paulo, Brazil

Source: Smith, S. (2018). Sao Paulo metro station [Photograph by Leo M. Santos]. Next City. https://nextcity.org/urbanist-news/retired-streetcar-makes-a-comeback-in-el-paso

One notable aspect is the efficient integration within São Paulo's larger transportation framework. The metro connects with buses, commuter trains, and even the city's monorail, allowing commuters to switch between modes of transport with relative ease. This integration is vital in reducing traffic congestion, which is a significant issue in this sprawling metropolis.

Also, the São Paulo metro is recognized for its accessibility. Stations are equipped with elevators, ramps, and other facilities, making it navigable for individuals with disabilities. And efficiency and frequency are key attributes. Trains run frequently, especially during peak hours, providing prompt and reliable service to the large population that depends on the metro for daily commuting. This high frequency helps to mitigate congestion and contributes to an overall smoother urban transportation experience.

In recent years, the São Paulo metro system has seen expansions and upgrades to meet the demands of a growing population. This includes line extensions, station renovations, and the introduction of new technologies aimed at enhancing the passenger experience. Such efforts are essential to ensure the metro system keeps pace with the evolving needs of São Paulo, a city in constant motion and expansion.

Bus Rapid Transit (BRT)

«More than 45 cities in Latin America have invested in Bus Rapid Transit (BRT) systems, representing more than 63.6 percent of the global BRT passenger count.»[7]

As was mentioned before, one of the significant strides in addressing their transportation challenges is the Bus Rapid Transit (BRT) system implemented primarily in Curitiba, Brazil, and later adopted in cities across the region. BRT systems are high-capacity public transportation solutions that combine the efficiency and reliability of a metro or light rail system with the flexibility and cost-effectiveness of buses. These mobility solutions offer several key advantages by dedicated bus lanes and infrastructure. Strategically designed stations with efficient boarding and alighting processes, along with prepayment systems and modern, high-capacity buses, contribute to reduced dwell times and improved passenger flow. This rapid public transportation, while being cost-effective compared to rail-based systems, can be equipped with signal priority technology to minimize travel times, and enhance service reliability. The adaptability of BRT systems, along with their integration with other transportation modes and a focus on environmental sustainability, makes them a valuable tool in addressing urban mobility challenges while promoting a cleaner and more accessible public.

According to BRTData (2020), Bus Rapid Transit (BRT) systems are a significant presence on the global transit scene, spanning 176 cities across the world. In Latin America around 56 cities embraced this efficient transit system, constituting 32% of the cities worldwide with this transport system. Also, about BRT corridor length Latin America leads with an extensive network of 1,863 kilometers, accounting for 35% of the global BRT kilometers. Finally, the ridership numbers reinforce Latin America's prominent position in BRT usage, with almost 21 million daily passengers, constituting nearly 61% of the global ridership for BRT. An example of how a well-designed BRT system can transform urban transportation by offering a fast, efficient, and sustainable mode of public transit is TransMilenio in Bogotá, Colombia. Launched in 2000 as a response to the severe traffic congestion and mobility challenges facing Bogotá, it is one of the largest BRT systems in the world and has been recognized internationally for being a central part of the city's public transportation network.

7 Rodriguez, y Vergel 2013 Sistemas de transporte público masivo tipo BRT (Bus Rapid Transit) y desarrollo urbano en América Latina Lincoln Institute of Land Policy https://www.lincolninst.edu/publications/articles/sistemas-transporte-publico-masivo-tipo-brt-bus-rapid-transit-desarrollo

Figure No. 2: Transmilenio, Bogota, Colombia

Source: The Bogota Post. (2014). Photo: Creative Commons https://thebogotapost.com/bogotas-transmilenio-system-a-painful-route-to-the-future/1177/

TransMilenio was designed to provide a faster, more efficient, and environmentally friendly mode of public transportation. The system has an innovative design with an environmentally friendly and modern fleet of low-emission buses that aligns with global efforts to mitigate climate change and enhance air quality within urban environments. The system places a strong emphasis on accessibility, incorporating low-floor buses, ramps, and adopting universal design principles in various features. This approach not only enhances access and service quality for passengers with disabilities but also demonstrates an unwavering commitment to inclusivity, guaranteeing that public transportation is accessible to all residents.

On the other hand, TransMilenio's unified fare system not only facilitates passengers to transfer between different routes within the system without additional charges, but also encourages the use of public transportation for longer commutes, reducing the need for private cars. This integrated approach, including traditional buses and cycling infrastructure, guarantees extensive coverage across Bogotá, providing accessibility to various neighborhoods and suburbs and ensuring that a significant portion of the city's population has access to rapid and reliable public transportation.

Continuously, Bogotá invests in TransMilenio, extending its network and implementing improvements to address challenges and meet growing demand. This commitment to ongoing development ensures the system remains effective and responsive to the city's needs. TransMilenio also illustrates Bogotá's commitment to enhancing safety within its public transportation network. To this end, the system has implemented a series of security measures, including increased police presence at stations and on buses, the installation of comprehensive video surveillance systems, and the introduction of panic buttons for passenger emergencies. Furthermore, the system collaborates with local organizations and the community to carry out crime prevention programs and conducts educational campaigns to raise awareness among users. These initiatives underscore Bogotá's proactive approach to ensuring a secure environment for TransMilenio passengers, serving as a notable example of the city's efforts to address safety concerns within its public transportation infrastructure.

The case of Curitiba

Curitiba, a city in Brazil, is renowned globally for its innovative Bus Rapid Transit (BRT) system, setting a remarkable example of efficient public transportation. Established in 1974, this BRT pioneered a model that emphasizes dedicated bus lanes, strategically located stations, and prepayment for faster boarding.

Curitiba's BRT system shares a fundamental characteristic with Bogota, distinguishing it from conventional bus systems. One of its prominent features is the provision of exclusive lanes dedicated to buses, ensuring uninterrupted travel, and substantially cutting down travel durations. These dedicated lanes grant priority to buses at intersections, facilitating swift and efficient transportation throughout the city. Additionally, strategic station placement is another hallmark of this system, similar to the approach adopted in Bogota. The stations are elevated and designed with efficient boarding platforms, attracting more passengers but also contributing to the system's overall effectiveness and appeal.

Curitiba's Bus Rapid Transit (BRT) system stands as a pioneer in sustainability with various strategic initiatives deeply ingrained in its design and operations. The buses run on fuel-efficient and eco-friendly technologies, underlining the city's commitment to reducing its carbon footprint and environmental impact. Furthermore, the Curitiba BRT system is continually evolving and expanding, with plans for new routes and improved infrastructure. This demonstrates the city's dedication to providing a convenient and sustainable public transportation solution for its residents. On the other hand, integration with green spaces is another significant sustainability feature. The BRT system in Curitiba is thoughtfully designed to harmonize with the city's greenery and parks. Stations and terminals are surrounded by lush greenery, not only enhancing the aesthetic appeal but also showcasing the city's dedication to preserving and integrating nature into its urban fabric. It's a statement of their commitment to sustainability that extends beyond the transportation domain.

The BRT system in Curitiba also encourages non-motorized transportation. Many stations have dedicated facilities for parking bicycles, promoting the combined use of buses and cycling. This initiative aims to further cut down pollution while advocating a healthier lifestyle for the community. It's a proactive approach that aligns with global efforts to reduce the impact of transportation on the environment.

Figure No. 3: BRT in Curitiba, Brazil

The Bogota Post. (2014). Photo: Creative Commons https://thebogotapost.com/bogotas-transmilenio-system-a-painful-route-to-the-future/1177/

The city of Guadalajara is Mexico's second largest metropolitan area with a population of 2.5 million persons and growing. In 2013, the city initiated the pre-investments studies to develop the 2nd BRT line for the metropolitan area ("Mi Macro Periférico"). The BRT runs 41.6 KM (equivalent to 25.8 miles), has 42 stations and connects with Line 1 and Line 3 of the Guadalajara Light Rail System. It was designed to transport 300,000 passengers per day. This capacity already peaked in real terms in 2022. It is a good case study for integration of urban mobility in a metropolitan area.

Box No. 2. Mi Macro Periférico, Guadalajara's BRT - A Revolution in Urban Mobility

In Mexico's State of Jalisco, Guadalajara's metropolitan area has undergone a transportation revolution with the introduction of Mi Macro Periférico, the largest Bus Rapid Transit (BRT) corridor in the country. Launched in January 2022 and supported by substantial funding from the Mexican National Bank of Public Works and Services (Banobras), totaling approximately 84 million dollars (1. 1.67 billion Mexican pesos), os), and an additional 40 million dollars (800 million pesos) from the National Infrastructure Fund in Mexico (Fonadin). This project exemplifies how strategic financing can drive transformative transport initiatives.

Integration is a fundamental aspect of this BRT system, connecting with other modes of transport, such as light rail lines, and dedicated bike lanes. This successful project showcases how strategic funding and thoughtful integration with various transport modes can significantly enhance urban mobility, providing a model for other cities. The corridor spans an impressive 41.5 kilometers, catering to the daily transportation needs of over 300,000 individuals and establishing vital connections between Guadalajara and 8 other municipalities within the metropolitan area.

Mi Macro Periférico isn't just about transportation; it's a comprehensive urban improvement initiative. The corridor spans an impressive 41.5 kilometers and caters to the daily transportation needs of over 300,000 individuals, establishing crucial connections between Guadalajara and eight other municipalities within the metropolitan area. It features 42 stations designed to enhance the urban experience, equipped with various amenities such as restrooms, breastfeeding areas. bicycle parking, and transfer bays for connecting to other services. The stations prioritize comfort and convenience and are universally accessible, incorporating ramps, elevators, and tactile guides to ensure inclusivity for for all

Mi Macro Periférico's success has exceeded expectations, with an impressive ridership of 32 million rides within the first six months of operation. This highlights the substantial demand for efficient public transport solutions that serve both urban cores and suburban areas. Key highlights of the project include seamless integration with existing transport infrastructure, prioritizing accessibility and enhancing the overall urban experience. The strong public response, with over 300,000 daily riders within a month of its launch, underscores its significance in addressing the transportation needs of the growing Guadalajara metropolitan area.

Source: Gobierno del Estado de Jalisco. MiMacroTeleferico. https://mimacro.jalisco.gob.mx/

Electric transport System

Electric transport systems are gaining momentum as sustainable alternatives in major cities worldwide, aiming to reduce environmental effects such as noise and air quality. This transition from traditional fossil fuels to electric power offers not only environmental benefits but also economic advantages, boasting an efficiency rate close to 90% and requiring less energy to achieve the same level of performance as traditional engines. E-mobility, which entails substituting fossil fuels with electricity across various modes of transport, is a significant opportunity for cost-effective and energy-sustainable decarbonization of the transport sector. Latin America, as one of the region's most vulnerable to climate change, recognizes the importance of e-mobility in advancing sustainable development.

Cities globally have implemented diverse business models to introduce electric buses (e-buses), addressing challenges like high costs, limited access to financing, and contractual complexities. Prioritizing the electrification of public transport is essential, given its substantial positive impact on emission reduction, transportation service quality, congestion mitigation, and urban livability. The overall cost of e-buses, encompassing acquisition and lifetime operating expenses, is lower than that of diesel buses, making these investments sensible in the medium and long term, especially with a suitable financing model. The integration of the energy sector into public transportation is crucial for addressing the technological challenges associated with electric mobility. Furthermore, the transition from conventional buses to electric buses, while improving services and establishing subsidies for purchases, requires substantial investments that can impact tax revenues.

Santiago de Chile is one of the leading cities in electromobility in LAC. The Santiago Metro, in collaboration with the Chinese company BYD, initiated one of the most ambitious e-mobility projects in the region in 2017, transitioning from conventional buses to electric buses while seeking to improve services and establishing subsidies, public and private investments for purchases. By the end of 2022, the Mobility Network already had approximately 809 electric buses, with plans to double this number by the end of 2023.

These electric buses have proven to be an efficient and sustainable solution for public transportation in the Chilean capital in just five years of operation. Covering over 128 million kilometers, which is equivalent to 167 round trips to the moon, and significantly contributed to improved air quality, and saved nearly 70 million liters of diesel, that have reduced greenhouse gas emissions (218,000 tons of CO2).

In just five years of operation, these electric buses have demonstrated their efficiency and sustainability as a public transportation solution in the Chilean capital. They have covered 128 million kilometers, equivalent to 167 round trips to the moon. This significantly improving air quality marking a remarkable environmental achievement, while saving nearly 70 million liters of diesel that has resulted in a decrease of 218,000 tons of CO2.

Figure No. 4: Electric Bus Fleet in Santiago de Chile, 2022

Source: Field, K. (2019). Santiago, Chile, Adding 200 Electric Buses in 2019. Clean Technical https://cleantechnica.com/2019/06/07/santiago-chile-adding-200-electric-buses-in-2019/

In addition to reducing greenhouse gas emissions, these e-buses provide a high-quality public transportation service, contributing to the reduction of road congestion and enhancing the city's livability. The e-bus implementation in Santiago primarily involves articulated buses, which are not only quieter but also provide a superior level of service compared to conventional buses. Likewise, an efficient charging infrastructure has been established throughout the city to support bus operations, including charging stations that allow buses to recharge their batteries quickly and effectively during scheduled stops.

Cable Car System

Cable car systems are innovative and efficient modes of urban transportation that use cable technology to transport passengers in cabins suspended from overhead cables. These systems have gained popularity in various cities around the world, including Latin America, due to their ability to address mobility challenges in hilly or mountainous terrain and provide reliable and environmentally friendly transportation options.

Many cities integrate cable car systems into their existing public transportation networks, allowing passengers to transfer seamlessly between cable cars, buses, trams, or metro systems using a single ticket or fare card. This system is particularly useful in cities with challenging topographies, such as steep hills, valleys, or rivers. They offer a practical solution for connecting neighborhoods that are difficult to reach by traditional ground transportation, offering to passengers a panoramic view of the city and its surroundings, and making the journey both practical and enjoyable. In Latin America, cities like La Paz (Bolivia) and Medellín (Colombia) have successfully implemented cable car systems to address urban mobility challenges.

«Mi Teleférico» system in La Paz is the world's highest and longest urban cable car network. It consists of multiple cable car lines that connect various parts of La Paz, including El Alto, a neighboring city to La Paz that is one of the highest cities in the world (13,123 feets above sea level). This system has greatly improved mobility and reduced travel times for residents in a cost-effective way, and is less susceptible to weather-related disruptions. At the heart of this system is the world-famous «Mi Teleférico» cable car network, which has revolutionized public transportation in the city.

One of the strengths of Mi Teleférico is its integration with other modes of transportation, including buses and the city's road network. Commuters can easily transfer between cable cars and buses, allowing for seamless journeys across the city. Besides, a notable feature of the cable car network is the stunning panoramic views it offers. Passengers can enjoy breathtaking vistas of the city, surrounding mountains, and the iconic Illimani peak as they travel to their destinations. This has turned the cable cars into a tourist attraction.

Figure No. 5: Cable Car in La Paz, Bolivia

Source: SA Expeditions. (2019). Mi Teleférico: La Paz's Brilliant Urban Cable Car Network. https://www.saexpeditions.com/blog/post/mi-teleferico-la-pazs-brilliant-urban-cable-car-network/

The success of Mi Teleférico has led to its continuous expansion. New lines are regularly added to extend the network's reach and benefit even more residents. Overall, Mi Teleférico in La Paz is a shining example of how innovative transportation solutions can address the unique challenges of a city's geography while improving the quality of life for its residents and visitors.

Figure No. 6: Cable Car in La Paz, Bolivia, Substations

Source: GRUPO A.M. (n.d.). Teleférico de las Ciudades La Paz y El Alto, Bolivia - Fase II. Grupo AM. https://grupoam.net/project/teleferico-de-las-ciudades-la-paz-y-el-alto-bolivia-fase-ii/

The «Metrocable» system in Medellín has been instrumental in connecting hilly neighborhoods with the city center and the metro system. It has improved accessibility and reduced social disparities by providing residents with easier access to education, healthcare, and job opportunities. It was designed to provide efficient and affordable transportation to the city's marginalized hillside neighborhoods, where traditional transportation infrastructure was challenging to implement due to steep terrain. The Metrocable has not only improved mobility for residents in these areas but has also promoted social inclusion by connecting them to economic opportunities and essential services. This innovative approach to urban transportation has garnered international recognition as a model for sustainable and socially equitable transit solutions.

The Medellín Metrocable system currently consists of two lines (K and J), financed using funds from the Municipality of Medellín and the Metro de Medellín Ltda. Company. Both lines complement and connect with the railway lines and have transformed the way residents of this Colombian city commute and interact with their urban environment, reducing social disparities and improving the quality of life for many residents. This system has received international recognition and numerous awards for its innovative approach to urban transportation and its positive social impact.

Figure No. 7: Cable Car System, Medellin, Colombia

Source: **Gondola Project (2023) [Photograph of Steven Dale].**
https://www.gondolaproject.com/medellin/

Bicycle System (non-motorized urban transport)

As another environmental transportation model, the bicycle emerges as an economically viable alternative. It plays a crucial role in decreasing greenhouse gas emissions, reducing energy consumption, and optimizing road space. Beyond these ecological benefits, cycling positively impacts citizens' quality of life, promoting physical health and environmental consciousness.

Latin America showcases successful examples of this transformation. Numerous LAC cities have initiated programs promoting cycling through public bicycles, making it more accessible, and significantly increasing daily cycling trips. Guadalajara has an average of 212,000 bicycle trips per day, Rio de Janeiro around 217,000, Mexico City 433,000, and Santiago de Chile has close to 510,000 daily bicycle trips.[6] However, several cities still face challenges in terms of cycling infrastructure and citizen demand.

According to the Biciciudades study conducted by the IDB in 2013 across 19 cities in the region, Bogotá has the largest cycling infrastructure with a total of up to 376 kilometers of exclusive bike lanes. But other cities, like Mexico City, have become bicycle-friendly cities not only through infrastructure development but also by investing in innovative furnishings, educational strategies for citizens, and safety policies both on roads and in parking areas. Mexico City has implemented a public bicycle system called Ecobici, that allows citizens and visitors to rent bicycles at strategically distributed stations throughout the city. With over 6,000 bicycles available at more than 450 stations, Ecobici has encouraged the use of bicycles as a sustainable mode of transportation in the Mexican capital. Additionally, the city has invested in expanding bike lanes and exclusive bicycle lanes, enhancing the safety and comfort of urban cyclists. Other Mexican cities, such as Guadalajara and Monterrey, have also followed Mexico City's example. As environmental awareness and the need for cleaner mobility solutions continue to grow, the use of bicycles as a means of transportation in the LAC Region is expected to increase, becoming an integral part of urban life.

Figure No. 8: Ecobici – Mexico DF

Source: Patel, D. (2017). What Can Other Cities Learn from Mexico City's Bike-Sharing Scheme? LSE International Development Blog. https://blogs.lse.ac.uk/internationaldevelopment/2017/12/08/what-can-other-cities-learn-from-mexico-citys-bike-sharing-scheme/

This phenomenon of environmentally friendly mobility solutions is also due to the collapse of other public and private transportation systems. This creates an opportunity for many new companies that have initiated bicycle rental businesses in cities, increasing the participation of the private sector in urban transport supply and covering the operations and maintenance costs of the service. Currently, citizens are seeking mobility alternatives that provide them with comfort and time savings, especially considering that during peak hours, commuting by car can take approximately three times as long as cycling.

To further promote cycling as a sustainable mode of transportation, local governments must implement enhanced incentives, improved infrastructure, and heightened awareness among residents. This entails augmenting incentives and policies for sustainable public transportation options like cycling. Vital measures include increased signage, traffic rule education, and road planning that integrates the city's public transportation system with dedicated bike lanes. Additionally, raising awareness among residents, coupled with safety enhancements, can help overcome barriers and mitigate negative externalities, making cycling a more widely adopted and regular mode of transportation for a larger portion of the population.

Box No. 3. “Pedaling Forward: Bogotá’s Extensive Cycling Network”

Bogota has made significant strides in promoting cycling as an eco-friendly and efficient mode of transportation. With a network of 608 kilometers of permanent bike lanes “clictorutas”, Bogotá is one of the cities with the most extensive cycling infrastructure in the world. These dedicated cycling routes are designed to facilitate safe and efficient biking throughout the city, separate from regular vehicular traffic. The length of this network greatly encourages cycling as a viable and eco-friendly mode of transportation for both reside and visitors. It contributes significantly to reducing traffic congestion and lowering the overall carbon footprint of the city.

On the other hand, every Sunday and public holiday, Bogota hosts a citywide event called “Ciclovía”. Over 120 kilometers of main streets are temporarily closed to motor vehicles and opened exclusively for cyclists, pedestrians, skaters, and runners. Ciclovía allows residents to enjoy physical activities, socialize, and appreciate the city from a different perspective. become an integral part of Bogota’s culture and a symbol of the city’s commitment to promoting a healthier lifestyle and sustainable transportation.

In addition to Ciclovía, the local government has actively promoted the use of bicycles implementing initiatives like “Bike to work” to encourage citizens to use bikes for their daily commutes. Additionally, bike-sharing programs have been established, allowing residents and visitors to rent bicycles at affordable rates, further promoting the use of bicycles as a practical and accessible mode of transportation.

Efforts to expand and improve the cycling infrastructure cyclists are ongoing, aiming to provide even more access and safety for cyclists. This holistic approach, combining both ciclorutas and Ciclovia, has contributed to Bogota’s identity as a bike-friendly city, promoting healthier living and reducing the overall environmental impact of transportation.

Source: 2019). Las localidades en Bogotá con más tramos de ciclorrutas [Photograph of Mauricio Moreno]. Metrocuadrado. https://www.metrocuadrado.com/noticias/actualidad/las-localidades-en-bogota-con-mas-tramos-de-ciclorrutas-2389/

Water transportation systems

Adopted in cities with access to water bodies such as rivers, lakes, or coastal areas, water transportation systems have been increasingly addressing road congestion and providing efficient alternatives for commuters. These water transportation systems not only help reduce traffic congestion but also contribute to environmental sustainability by offering an alternative to fuel-consuming vehicles. Additionally, they provide picturesque views of the cities and contribute to a more pleasant commuting experience for residents.

The first example of a fluvial system is Rio de Janeiro, Brazil that has a well-developed water transportation network that includes ferries and catamarans. These watercraft connect different parts of the city, including neighborhoods along the coast and islands, providing a scenic and efficient mode of transportation while reducing the strain on the road infrastructure. The ferry system is particularly popular for commuters traveling between Niterói and Rio de Janeiro, offering a faster and more enjoyable journey compared to congested roadways.

Secondly, Buenos Aires, Argentina implemented a waterbus system, known as «Colectivos Fluviales,» that operates on the Parana River Delta and connects various islands and waterfront communities to the urban core. It's an essential means of transportation for residents in these areas and offers a unique way for tourists to explore the city's surrounding natural beauty.

Figure No. 9: Urban River Transport, Parana River, Buenos Aires, Argentina

Source: Luongo, M. T. (2010). 28 Hours in Tigre, Argentina. The New York Times. https://www.nytimes.com/2010/11/28/travel/28tigre-overnighter.html

The waterbus system plays a crucial role in providing essential transportation services to residents of the islands and remote areas within the delta. For many people living in these communities, water transport is the most practical means of commuting to and from the city center. In addition to serving as a commuter service, the Colectivos Fluviales system is also a popular choice for tourists to access various attractions, including restaurants, nature reserves, and recreational areas.
Lastly, Valdivia, located in southern Chile, is a city renowned for its unique approach to urban mobility through the Valdivia Fluvial System. This innovative transportation system takes full advantage of the city's network of rivers and wetlands which is known as the south pearl.

Valdivia, located 750 kilometers south of the Chilean capital and home to one of the country's most important university hubs, has historically had a close relationship with its rivers until the devastating earthquake of 1960. With no more than 150,000 residents, the city faces significant traffic congestion and limited opportunities for expansion or infrastructure development. Starting 2021, through public-private partnership the city launched the project Puerto Solar, aims to reconnect the city with its waterways, promote public river transport powered by clean energy, and offer an alternative to congested roads that is gaining ground.

Figure No. 10: Urban Waterways Transport, Valdivia, Chile

Source: Cadagán, (2023), «UACH Invita a Conocer Cuál es la Realidad del Transporte Fluvial en Valdivia.» Diario de Valdivia. https://www.diariodevaldivia.cl/noticia/actualidad/2023/06/uach-invita-a-conocer-cual-es-la-realidad-del-transporte-fluvial-en-valdivia

The system includes boats with solar panels and electric motors along the river that have a capacity of 15 passengers each and, on average, transport around 3,000 people per month, with peaks of up to 4,500 during the summer season. Also, the system currently operates six stops, and ticket prices range from 800 pesos (0.8 dollars) for the standard fare to 400 pesos (0.4 dollars) for seniors and 260 pesos (0.26 dollars) for students.

One of the key advantages of the Valdivia Fluvial System is its environmental sustainability. Valdivia's experience serves as an inspiring example of how cities can leverage their natural assets to develop sustainable and efficient transportation solutions while simultaneously reducing their environmental impact.

Economics of the Sector

The economics of the transportation sector in Latin America vary from city to city but generally involve a mix of funding sources. End-user tariffs, such as public transportation fares and tolls, contribute to a portion of the sector's revenue. However, many cities also rely on government subsidies to keep transportation affordable for citizens. These subsidies are often necessary to ensure equitable access to transportation services, particularly for low-income populations. Additionally, the positive externalities associated with efficient transportation systems, such as reduced air pollution and improved productivity, contribute to the overall economic benefits that justify government investment and subsidies.

Externalities

Urban mobility in the collective category (i.e., public transportation) has all the attributes of a monopoly from a public services provision. It also has the characteristic of a network industry since different modes of transportation (i.e., light rail, tram, bus rapid transit, buses, etc.) need to be coordinated and provide services in an integrated way (i.e., multimodal). Balancing the incentives for the right choice between personal decisions (use of cars, motorcycles, bikes, or walking) competes with collective decisions (i.e., public transportation), and is not always evident as the type of best practice in terms of public policies. Urban mobility carries a set of positive and negative externalities that are not always easy to "price". Positive externalities such as the benefits of agglomeration, or the increased in land value, or the provision of emergency services, compete with negative externalities such as traffic congestion, environmental impact (i.e., CO2 emissions, air, and noise pollution, etc.), and safety hazards and health. Pricing these externalities adds to the cost of providing the public transport service increasing the affordability risk by end-users[8].

8 Traffic congestion is a negative externality caused by various factors. A 2005 American study stated that there are seven root causes of congestion, and gives the following summary of their contributions: bottlenecks 40%, traffic incidents 25%, bad weather 15%, work zones 10%, poor signal timing 5%, and special events/other 5%.[3] Within the transport economics community, congestion pricing is considered to be an appropriate mechanism to deal with this problem (i.e. to internalize the externality) by allocating scarce roadway capacity to users. Button, Kenneth J. (1993), Transport Economies, Second Edition.

One of the highest negative externalities costs in the case of LAC cities has been the impact of inefficient public transportation on the development of informality. A study conducted by IDB in 2016 on 20 metropolitan cities in LAC determined that the average commute time (round trip) using public transportation from peri-urban areas (where rural migration concentrates) to the work location was in average between 3 to 4 hours. The average end-user price (subsidized) paid by the end-user (worker) represented close to 2 hours of minimum salary. The math is simple. Adding 3 to 4 hours to my work shift (for which the worker does not get paid) and subtracting from the daily payment two hours due to transport costs, incentivizes informality. Better to stay close to home and sell any type of merchandise and work 8 hours and save the 2-hour costs of the urban transport tariff.

Figure No. 11: LAC, Inefficient Urban Transport as an incentive to Informality

Source: IDB, ESCI Program, 2016

High Upfront Costs and location specific challenges

Public urban transport infrastructure defined as the needed capital investments required to provide collective transportation (public transit) is inherently “lumpy”, involving huge upfront investment costs that are for long-term use and location specific (with the exemption of the rolling stock). Investments in light rail systems (LRTs), bus rapid transit systems (BRTs), subways and cable cars, and other means of public transportation tends to be expensive and location specific (i.e., for financing purposes it is very difficult for a lender to repossess an urban transport infrastructure asset and place it in another location where better market results would make the asset profitable).

The creation of these public urban infrastructure assets have in economic terms a size or scale threshold to make the investment attractive. It also has some elements of inelastic demand, capacity adjustments and long-term project completion that creates important project risks which makes the financing expensive and the need for public support (i.e., subsidies – implicit or explicit) very demanding on public finances. As we will see in the next section (i.e., financing the service provision), these types of infrastructure carries a very important level of affordability risk. End-users cannot afford to pay the full cost recovery tariff that these public urban transport infrastructure assets require to fully cover operational costs and capital costs.

However, we need to ensure equitable access to these types of services. Equitable access usually translates into end-users' tariffs that are usually highly subsidized by the government to ensure that the overall societal benefits can be realized. Thus, providing a well-functioning public transport system as a public good and service, is not profitable. For example, fares on public metro systems in Paris, Chicago, Madrid, Washington, or Boston, only recover less than 40% to 45% of the operating costs (Agarwal, 2018). The rest is subsidized by the government. Nevertheless, ensuring adequate urban public transportation increases the competitiveness of the local economy, reduce the impact of negative externalities (i.e., congestion, environment, health hazards, etc.) and improves the impact of the positive externalities (i.e., agglomeration benefits, increased in land value).

Without effective urban public transportation, the population opts for private and informal means of transport (i.e., personal cars and informal buses and taxis, sometimes also motorcycles). The use of these personal and informal means of transport exacerbates the negative externalities of the sector via congestion and pollution creating more constraints to the positive impacts of urbanization. LAC is a continent, where this situation of high urbanization rates blended with poor planning capacities have led to very inefficient public urban transportation systems adding pressure in the end-user opting for personal and informal means of mechanized transport.

Figure No. 12: LAC, Increased in the Personal Car Use (2016-2030)

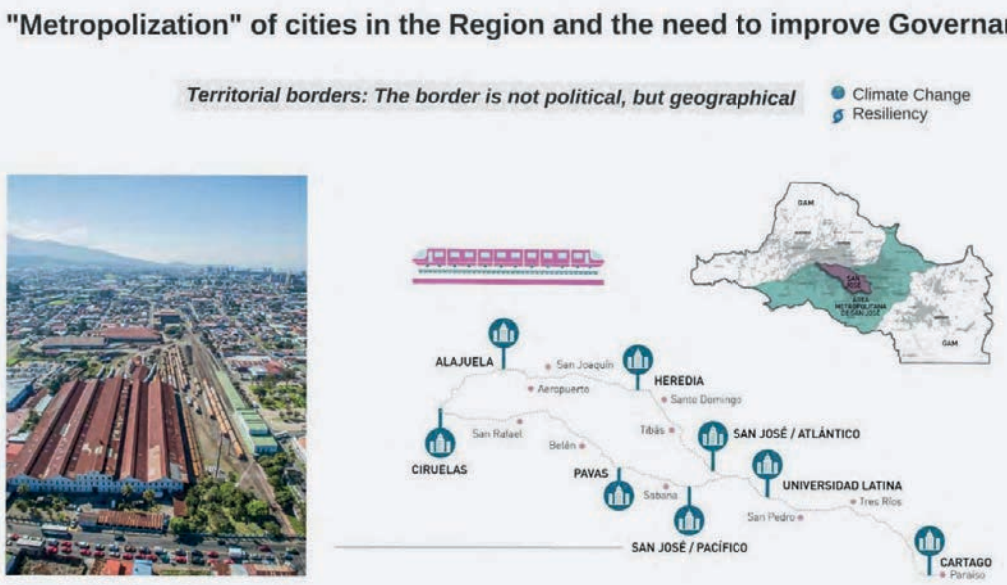
Institutional Framework and Organization of the Sector

Urban Public Transport Systems (UPTS) are a complex "habitat" of different stakeholders led usually by different sets of incentives. Harmonizing this "habitat" and the relevant stakeholders is not always evident and/or easy. Getting the adequate institutional framework -- at the city level -- for the development of UPTSs -- will improve the efficiency of the service provision, will reduce the negative externalities, and optimize the positive externalities. The provision of the service (UPTs) is essentially a public good, the users are private citizens, and the system operators can be both public and private agents. These stakeholders (i.e., government – local, regional, and national, operators, and passengers) constituting the system should be considered in an integrated and holistic way. The government in the form of a regulator or transport authority plays a regulatory role in the management of public transport systems, and the operators (private or public) provide public transport services to the passengers.

In some cases, local governments or municipalities directly provide public transport services to the passengers with or without franchised, contracted, or deregulated private operators. All public transport entities or organizations constituting UPTS are embedded in an institutional environment which shapes the interests, incentives, and actions of these organizations. The interdependence of these stakeholders providing complementary and integrated transport services requires an institutional framework by which roles, interests, and actions of the UPT actors are defined. Deregulated models, for example, can result in uncoordinated and disintegrated service provision unless such a well-defined institutional framework is in place. Many cities in LAC have suffered the consequences of high and rapid growth of deregulated (informal) UPTS, increasing the negative externalities (i.e., congestion, pollution, and insecurity), and reducing the value of positive externalities. Many cities such as Culiacan and Guadalajara in Mexico have opted for city-driven technical assistance and financing programs (i.e., buses and taxis) to assist in the "formalization" of these unregulated sectors. It is a high effort high reward type of project. Both experiences seem to have shown positive results.

A recent phenomenon (last 20-years) that is affecting the need to adapt the institutional framework for renovated UPTS is the "metropolization" or urban clusters in LAC. With the rapid urbanization and increase of the urban footprint cities have become more integrated into single cluster areas where public service provision in areas such as urban public transport needs to be planned in an integral way covering the total urban area of the metropolitan area (i.e., integration of all cities in the same urban cluster). The city of San Jose in Costa Rica, has been considering a metropolitan approach to the planning of the urban transport service provision, given that the urban growth of the five cities in their cluster have created a de-facto metropolitan area (i.e., Alajuela, Heredia, Cartago, Ciruelas and Pavas).

Figure No. 13, Costa Rica, The Metropolization of San Jose, Urban Public Transport



Economic Regulation

Given the affordability risk issues surrounding the UPTS, end-user tariff charges and pricing mechanisms (i.e., congestion charges, environmental charges, etc.) become a important and complex function, which needs to be administered by the local authorities (in coordination with regional and/or national authorities as the sector policy requires in such location). Economic regulation in public urban transport is a demanding activity that requires high levels of institutional capacities and monitoring and managerial abilities. Private sector provision in UPTS (i.e., metro, light rail, BRTs, cable cars, trams, urban rail, etc.) requires smart regulation given that end-user's fees will not cover the full cost of service provision. Some type of public support (i.e., availability or capacity payment plus a variable charge per passenger) will be needed to allow private capital financing of the required infrastructure (and rolling stock).

As advanced mobility services and technologies have penetrated cities, economic regulations need to adapt and create the right set of incentives. National or state-level regulations, such as tax breaks and incentives for Electric Vehicles (EVs), have given a boost to integrated mobility in many cities, but local regulations, such as traffic rules that reserve bus-only lanes on city streets, could be even more consequential. To capture the benefits of integrated mobility, governments may want to consider creating regulations that encourage consumer-friendly developments while also promoting larger public goals, such as clean air and reduced congestion. Individually, these trends will have a profound influence in the future of UPTS pricing.

Climate Change and Technology

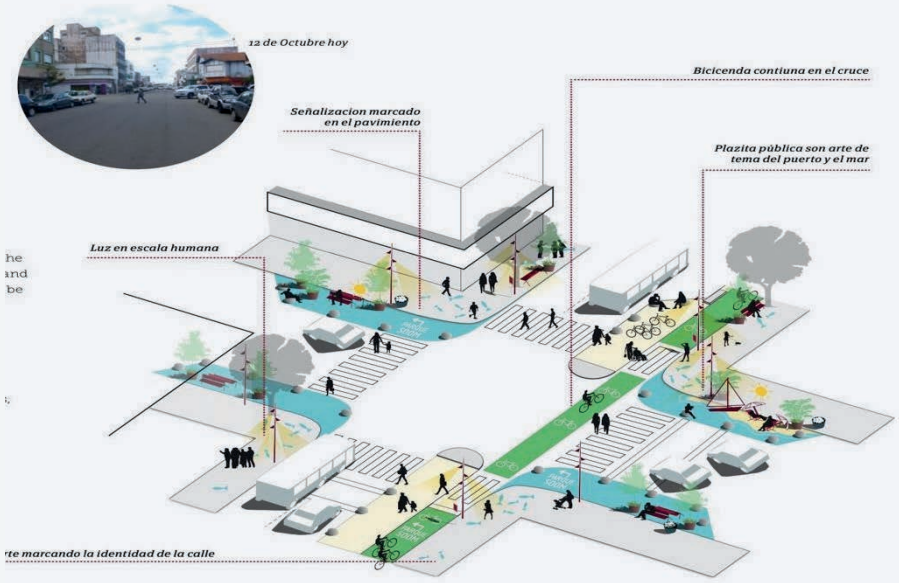
These two factors will create an intense pressure in the economics of the sector. The trend towards integrated urban mobility via the deployment of new technologies, like vehicle electrification and the development of autonomous-driving technology, relate directly to mobility. Other, broader trends will also have important implications. The decentralization of energy systems, for example, will make a difference as modes of transportation come to rely more and more on electricity as an energy source. Shared mobility via ride-hailing services have grown rapidly over the past few years and now compete not only with traditional car-sharing and carpooling providers but also with public transit and private vehicle ownership. Autonomous driving. Advances in autonomous driving technology promise to resolve road-safety concerns, reduce the cost of transportation, and expand access to mobility. Bloomberg New Energy Finance estimates that battery costs will drop below $100 per kilowatt-hour in the next decade. If that happens, EVs should achieve cost competitiveness with conventional vehicles within the next decade[9]. Cities represent close to 75% of worldwide emissions. Of these amounts a significant percentage is explained by the emissions for use of urban mobility systems (i.e., collective, individual and freight). Smart pricing via congestion and environmental charges coupled with the use of cleaner technologies will also have a high impact on the economics of the sector.

9 McKinsey, The Future of Mobility, 2017

Land Use

Urban transportation has historically had a dramatic influence on land-use patterns. Upon the invention of horse-drawn and then electric streetcars, "streetcar suburbs" quickly arose along newly laid tracks. Urban transportation is defined with respect to particular locations. The ways in which such locations are used (i.e., land surrounding the development of public urban infrastructure – rail tracks, dedicated bus lines, passengers' stations, etc.) for commercial, business, tourist, or recreational purposes, will have a profound impact on the economics of the public urban sector. In particular, a dispersed land-use pattern undermines the market potential of mass transit, making it ineffective as a means to counter the automobile's dominance, even if promoting mass transit might have been a better policy in the first place. Mar de Plata in Argentina, with a population of 700,000 (2022) hired Gehl Architects in 2015 to evaluate their land use in the downtown area. The city ran a pilot test in Guedes Avenue (a highly transited commercial zone of downtown), where the percentage allocation of space between motorized vehicles (street and parking) and walking and recreational space was 80% to 20% (i.e., an allocation ratio of 4 M2 for motorized and 1 M2 for walkability). In the test, via use of movable infrastructure (i.e., street designs, trees, and greenery, etc.), they altered the space allocation to 60% (motorized vehicles) 40% (walkability and recreational). Commerce and retailers were concerned that such changes will impact their sales, losing clients and exposure (i.e., less vehicles per unit of time). After 6 months of monitoring by the municipality, commerce experienced a 40% increase in sales.

Figure No. 14: Mar de Plata, Argentina, Avenue Guedes, redistribution of public space



Source: IDB, ESCI Program (2015)

The ways in which cities can "monetize" the land value improvements (i.e., land value capture), of important infrastructure investments in urban public transport systems (i.e., rail tracks, bus lines, metro stations, bus dedicated lines, etc.), has a very important impact in the economics of the sector and in the ways, cities can fund needed infrastructure via private capital mobilization The commercial value of previously underutilized real estate assets via private sector developments can generate important cash flows (i.e., property taxes, profit sharing, land leases, advertising revenues), to help finance needed urban infrastructure.

Political Economy

As previously explained, public urban transport is a complex ecosystem with different stakeholders and high impact on a city's economic and social development. For a rapidly urbanizing world, well-planned and well-functioning urban transport provides vital arteries for efficient urban economies, linking the poor and disadvantaged to opportunities and services, and helping address key transport-induced challenges such as congestion, pollution, safety, and sprawl, that evolve without appropriate planning, regulation, and investment. Provision of adequate and efficient public urban transport has a huge political economic impact that needs to be managed. Box No. 2 below illustrates via the "Just City" concept the need to manage well the political economy of this relevant urban infrastructure sector.

Box No. 4: The Just City Concept

The Just City concept seeks to unpack and provide a framework in which urbanization can occur, wherein there are just outcomes for all those living in the city. The elements of the Just City framework are not new. They build on the work by French sociologist and psychologist, Henri Lefebvre (1968), who highlighted that the use value of the city is more important than its market value. The current status quo across most African countries is the emergence of unjust cities (Maihack, 2020). This includes the proliferation of informal settlements, unequal land distribution and insecure tenure, precarious and informal labor markets that do not provide decent work, as well as unequal opportunities to access and benefit from the cities, amongst other factors. From a workers' perspective, it relates to a lack of quality employment resulting in the need to pursue a precarious working existence to survive, rather than thrive in the city. This is particularly related to the "invisible urbanites", namely those living and operating in informality and who remain some of the most vulnerable citizens and workers.

The pillars of the "Just City" (Omenya, 2020) are: (a) Dignity (the right of an individual or group to be valued, respected, and treated ethically), (b) Equity and diversity (the city and its benefits are shared equitably amongst all persons living there), (c) Rights and responsibilities (the rights of all citizens are observed, yet at the same time, citizens also take responsibility in further developing their city), and (d) Democracy (decisions are made collectively based on an informed majority, which is crucial to ensuring functionality of the city for all the people living in it).The pillars and principles of the Just City concept can be applied to specific elements within the city, including to public transportation. Simultaneously, efficient, and effective public transportation systems are also critical in achieving the overall aims of a Just City.

Source: The Political Economy of Urban Transport in Africa, Friedrich-Ebert-Stiftung, Trade Union Competence Centre for Sub-Saharan Africa, 2023.

Financing the Provision of Services

The key constraint for the adequate financing of public urban transport infrastructure is affordability. In a world where end users' tariffs and fees could be set at full-cost-recovery levels and where consumers had the disposable income to pay for them, financing infrastructure would be easier, and the gap would be substantially lower. This is not the case worldwide today, much less in EMDE countries and even less so in LDEs[10]. Private capital would only flow into projects if the revenue source for debt and equity is secured. Revenue sources to develop and operate infrastructure assets come from essentially two sources: (a) end-user tariffs and fees and (b) taxes and public budget spending (including subsidies, grants, revenue expenditure and so on). In most sectors, full-cost-recovery tariffs will not be possible, except for some specific sectors such as telecommunications or sectors with commercial clients (such as ports and airports). In this context, no matter how innovative and efficient a financing structure is, a project must have adequate cost recovery mechanisms and/or public support with credible sources of revenue to service and repay the capital structure of such a project (i.e., both debt and the equity).

Among the challenges for infrastructure development, access to adequate financing stands out as one of the most relevant issues to solve. The poorer the country, the more difficult it is to access adequate financing for development of sustainable infrastructure. This section will describe the available funding mechanisms to finance infrastructure development, including urban transport infrastructure, and how challenges accessing adequate financing hamper efforts to narrow the current infrastructure gap. The section will also introduce the use of public-private partnership (PPPs) mechanisms as a tool to increase financing support for infrastructure development, and the relevance of maximizing private capital mobilization to effectively reduce the infrastructure gap.

10 EMDE=Emerging Markets and Development Economies, LDCs = Less Developed Countries

Financing Infrastructure[11]

Governments can fund infrastructure at the national, regional, or local level through public procurement or private procurement (public-private partnerships and private provision of public services). In each case, financial flows to support infrastructure investments will be originated through two different mechanisms: (a) end-user fees and (b) public support, including all available options (such as subsidies, government transfers, tax incentives, and support from development finance institutions). In emerging market and developing economy countries, infrastructure is primarily funded through a blend of these two sources. For a project to be bankable, the revenues resulting from the sum of the two sources has to be able to cover the operating expenses of providing the public service, including its maintenance and rehabilitation, as well as the remuneration to long-term financing (both debt and equity). More recently, these revenues should also cover negative externalities such as the impacts of climate change, or congestion in the case of urban mobility.

Box No. 5: The Impact of Transportation Subsidies[12]

In the context of the transportation sector in Latin America and the Caribbean (LAC), subsidies for public urban transport are commonly implemented. The primary aim of these subsidies is to enhance the affordability of transportation for the population.

By reducing the costs associated with transportation, the goal is to encourage the use and frequency of public transportation systems, ultimately improving access to essential services and economic opportunities.

A study by Phillips (2014) examined how transportation costs impacted job searching in urban low-wage labor markets. The results demonstrated a significant short-term increase in job search efforts for the transit subsidy recipients compared to a control group that received standard job search services without subsidies. Within the initial two weeks, individuals benefiting from the transit subsidies applied for and were interviewed for 19% more jobs than those without subsidies. This study supports the theory that search costs can diminish job search intensity over time, contributing to persistent urban poverty in neighborhoods distant from job opportunities.

Similarly, Franklin (2017) arrived at comparable conclusions while examining the circumstances of young job seekers residing far from the city center. The research illustrated that search costs pose significant barriers to employment, with individuals who received experimental treatment displaying heightened job search intensity and an increased likelihood of securing stable and satisfactory employment opportunities. These findings underscore the importance of subsidizing transportation to facilitate job searches and economic mobility.

11 This subsection refers exclusively to economic infrastructure (transport, energy, water and sanitation, solid waste management, etc.). It is based on a recent World Bank Publication, Global Review of Public Infrastructure Funds, Optimizing the Use of Public Support for Infrastructure, June 2020.

12 Yañez-Pagans et al. Lat Am Econ Rev (2019) Urban transport systems in Latin America and the Caribbean: lessons and challenges.

End-user fees

Charging end users, a levy for the public services they receive is a mechanism for financing infrastructure projects that share the characteristics of a private good. For example, users can easily be identified and asked to pay a price proportional to the benefits they receive. Several public services meet these characteristics, including urban transport, electricity, water supply, and solid waste management. User charges accomplish several positive outcomes that make levies attractive beyond simply representing an important source of revenue. Fees set on an efficient pricing basis affect the demand for services, which minimizes the inefficiency risk of overconsumption. For instance, underpricing water supply leads to overuse, as price signals lead to the rationalization of water consumption. Charges also help internalize the spillovers generated by the provision of the service, such as the impacts of public urban transportation in greenhouse gas emissions and its contribution to climate change. Despite the importance of efficient pricing for user charges, in practice levies on infrastructure services in emerging economies are rarely sufficient to cover capital, operating, and maintenance costs, let alone any negative externalities.

However, distorted pricing schemes work against this—and often result in a "vicious circle". Prices are set below cost-recovery levels, a situation that leads to cuts in operations and maintenance. This ultimately deteriorates services and deters the propensity of end users to pay, progressively increasing the gap to achieve full recovery costs and the dependence on subsidies, making private sector participation in service provision unattractive and impairing public finances. Governments facing this situation have two options: (i) to increase tariffs to cost-recovery levels or (ii) to establish transparent and efficient subsidy mechanisms. With the exception of the telecommunications sector (mostly in private hands in emerging economies), ports and airports (given that their users are mostly high-middle-income consumers or corporations), and some areas of the energy sector (commercial electricity distribution and transmission), the rest of the sectors have their average tariffs and fees usually set below cost-recovery levels in emerging economies. For the Latin American and the Caribbean region alone, the pricing gap estimates (tariffs as a percentage of full cost recovery) has been estimated around 50 percent for public transportation, water and sanitation, and solid waste.

Public support

Intergovernmental transfers can help governments increase infrastructure investments, especially in jurisdictions or sectors with budgetary constraints. However, depending on how transfer programs are structured, they can lead to different levels of infrastructure spending. Better-designed programs reduce the volatility of public sector budgets and provide credible risk guarantees that attract private capital into infrastructure finance. Nevertheless, with few exceptions, existing intergovernmental transfer programs in emerging economies do not meet these criteria. Included in the subsidy mechanism (government transfers) are different payments that governments commit to provide to private sector sponsors for the provision of public services. These are earmarked government transfers (current, future, and contingent) to support private investments in the provision of public infrastructure services. From availability payments to complement end-user tariffs set below cost-recovery levels, to contingency payments in the event regulatory changes limit project cash flows (partial risk guarantees), these are earmarked government transfers to make infrastructure provision by private providers financially possible. Government transfers come directly from budgetary sources and are based on current tax revenues and other government sources.

Fiscal management of these earmarked government transfers is key to the fiscal sustainability of an infrastructure development program. Managing the contingent liabilities that arise from these types of government support (future transfers and guarantees) is critical to successful government-led infrastructure development strategies. When infrastructure is financed via subsidies (government transfers), it is done against public sector resources of that budget year (or years). In this case, taxpayers' current resources are being used to fund infrastructure today. Alternatively, governments can issue public debt. In that case, taxpayers' future resources are being used, with a set of implications for the future fiscal sustainability of the country. Public debt is generally less expensive than corporate or project financing debt.

Public Sector Debt

When infrastructure is financed via subsidies (government transfers), it is done against public sector resources of that budget year (or years). In this case, taxpayers' current resources are being used to fund infrastructure today. Alternatively, governments can issue public debt. In this case, taxpayers' future resources are being used, with a set of implications for the future fiscal sustainability of the country. Public debt is generally less expensive than corporate or project financing debt, except for selected transactions where the project credit rating could pierce the sovereign credit rating ceiling in the country.[13] The debt raised via public issuance will be reflected in government accounts. Hence, the fiscal managers will be able to better forecast, monitor, and manage it. However, the developed world and the emerging economies have widely differing experiences with raising debt due to the underlying credit rating of their economies.[14]

Private Procurement: Mobilizing Private Capital

When considering the execution of infrastructure development projects in urban mobility, local governments have two different procurement options: public provision, or private provision. Local governments in emerging economies can also encourage private sector investments (through debt or/or equity) for the provision of infrastructure services by fostering an environment that enhances investors' perception of the risk-to-return ratio. Over the last two decades, Latin America and the Caribbean and Asia have attracted more private capital for infrastructure development than any other developing regions, illustrating the potential of private sector involvement in the provision of infrastructure services.

Private sector participation is prevalent in the telecommunications and electricity sectors, representing 70 percent of total private investment in developing countries. Both sectors usually enjoy less stringent regulations than others, allowing for cost-recovery tariff structures, thus making them appealing to private investors. Meanwhile, urban-related projects including public transportation, water, and sewerage amount to only 15 percent of total private investment in developing countries.[15] These services are generally provided under natural monopolies, making them susceptible to greater government oversight and intervention, which investors tend to associate with high political and fiscal risks.

13 Even in such a case, the financial structuring costs, to develop a project finance structure that pierces the sovereign ceiling, need to be added to the overall financing cost. It is likely that the overall financing costs would be higher than the sovereign.

14 Private debt flows are not considered to be part of the infrastructure financial flows, given that they respond to the financing strategies of each private provider, and this debt is supported by one of the three infrastructure financial flows. In the event that the private debt is guaranteed by the government, it is considered public debt.

15 World Bank, PPIAF, PPI database, 2016.

Public-private partnerships (PPPs) are useful mechanisms to mobilize private capital, but they can be cumbersome and have relatively high implementation challenges, particularly in less developed economies. The PPP methodology offers a novel approach to infrastructure provision that brings private sector competencies, efficiencies, and capital to improve public sector asset efficiency and the delivery of infrastructure services. The private sector agrees to take on risk and management responsibility in exchange for profits linked to performance.[16] Certain risks are better managed by the private sector in infrastructure development (such as design and construction risk, and operational risk) and those specific risks should be allocated to the private sector for efficient management.

African Development Bank

The African Development Bank (AfDB) provides important financial and technical assistance to African Cities through different funding sources (i.e., own and third party funded sources), deployed via different financial and technical assistance products. With the exception of South Africa's metropolitan cities, African cities have not been able to borrow on their own balance sheets. This is because in many countries, the legislation and regulatory framework in place is either limited in its allowance of cities to borrow without Sovereign Guarantee or does not allow independent access to debt by municipalities. Furthermore, many cities have not received a positive credit rating, or are not deemed creditworthy. In an attempt to improve this situation, the Bank Board of Directors approved the first and possibly only existing among MDBs, "the Guidelines for Subnational Finance," which allow the Bank to lend directly to Subnational entities such as cities, and other local governments. For further information on the AfDB financial support to African Cities please refer to Annex No. 1 of this note.

Role of the Private Sector

As described in the previous section, third-party financing from private capital mobilization could represent an important financing source for the provision of public urban transport services. Municipalities could also encourage private-sector participation (through debt or equity) for urban infrastructure financing by fostering an environment that enhances investors' perception of the risk-to-return ratio.

The lack of comprehensive transportation infrastructure is a consequence of multiple economic, political, and institutional factors. The insufficient technical, financial, and legal frameworks for project execution, the absence of a legal structure that promotes project development, and the lack of public policies and long-term strategies guiding investment and infrastructure development in the transportation sector.

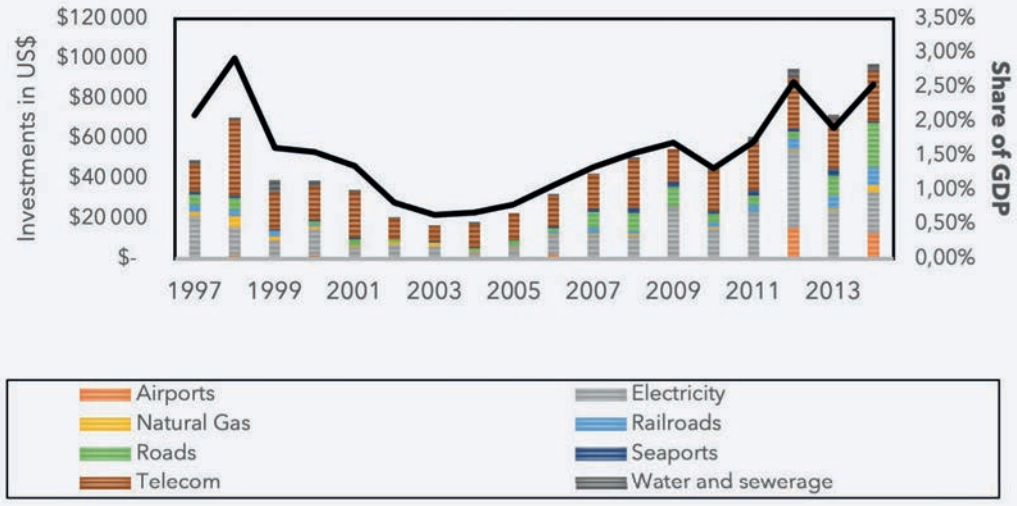
16 World Bank Group and PPIAF 2016.

Given these challenges, the national government recognized the urgency of enhancing the situation to encourage private sector participation in financing and advancing the country's infrastructure. This awareness underscores the importance of creating a conducive environment for private capital involvement in the development of the nation's transportation backbone.

In Latin America and the Caribbean (LAC), there's a pressing need for increased infrastructure investment, estimated at around 5% of the GDP to cover the region's infrastructure requirements. However, the actual investment falls far below this, typically hovering at 2% to 2.5% of the GDP over the last decade.[17] To bridge this substantial infrastructure gap, collaboration between the public and private sectors is essential. The PPP model, originating from the UK in the 1970s, was introduced in Latin America during the late 1980s and early 1990s, initially focusing on construction and operation concessions for roads.

Over the last two decades, LAC has attracted more private capital for infrastructure financing than any other developing region, illustrating the potentiality of private-sector involvement in urban infrastructure (Serebrisky et al, 2015). Between 1997 and 2014, the private sector committed US$851,593 million to finance 1,635 infrastructure projects for different sectors in the LAC Region.

Figure No. 15: Annual private investments in infrastructure by sector in LAC (1997 – 2014)



Source: World Bank, PPIAF, PPI Data Base, 2015

Public-Private Partnerships (PPPs) are characterized by four fundamental aspects:
Long-Term Alliance: The collaboration between the private and public sectors should extend over a significant duration, typically exceeding ten years.
Private Sector Engagement in Financing: The private sector should actively participate in financing the projects, sharing the financial burden with the public sector.
Private Sector Involvement in Project Maintenance and Development: The private sector assumes a substantial role in maintaining and advancing the projects throughout various stages.
Clear Risk Distribution: The partnership should establish a clear allocation of risks between both sectors to ensure fairness and stability.

PPPs offer a potential solution to overcome limitations in public provisions, addressing issues

17 https://blogs.worldbank.org/ppps/decade-ppps-latin-america-and-caribbean-what-have-we-learned

like inefficiencies, technical skill gaps, slow procurement processes, and budgetary limitations. However, they also pose concerns, especially in large-scale projects, involving technical, financial, environmental, and social risks. Successful PPPs hinge on a robust focus on risk allocation, dispute resolution, and a thorough analysis of their «value for money» proposition. Transparency is a critical factor in mitigating corruption risks, which have gained significant attention in Latin America and the Caribbean (LAC) recently.

Despite being a leading region for PPPs in the late 1990s, a decline in investments occurred due to poorly implemented projects. Public-Private Partnerships (PPPs) have reemerged as an improved tool since 2005 to facilitate joint efforts in addressing this issue. Due to economic challenges, numerous nations in Latin America and the Caribbean (LAC) took significant steps like setting up specialized agencies and enhanced regulations. From $8 billion in 2005, these investments soared to an impressive $39 billion in 2015. Remarkably, over a decade, LAC attracted a staggering $361.3 billion in investments, funding approximately 1,000 PPP infrastructure projects. These projects were primarily focused in the energy and transport sectors.

PPP «success» is all about making transportation better for everyone. It means saving money by doing things in the smartest way possible and making sure people get the services they need quickly and at a good price. There are different ways to set up PPPs:

Mixed Public-Private: This model involves shifting operations and maintenance services and responsibilities under a mix of public and private ownership or control. Both sectors (public and private) work together and share obligations to manage and fund the project.
Public-Special Purpose: This involves transferring the responsibility for operations and maintenance services to a commercialized special purpose vehicle, often with incorporation, under public ownership or control. The aim is to achieve commercial efficiencies.
Build-Operate-Transfer: Partnering with a private company to design, build, run, and later transfer control of a facility or group of assets to the government. The private company pays for the initial costs over time like a lease, but the facility still belongs to the public.
Build-Own-Operate: Giving ownership rights to a private company for developing, funding, designing, building, running, and looking after a transport facility. The private company owns it, handles the financial risks, and keeps any extra money it makes, but the facility remains for public use.
Private Concession: This arrangement involves transferring the duty of operation and maintenance services to a private entity under a fee-for-services contract following a competitive selection process.

Public investment is the norm for ***roads,*** but there are opportunities for private participation in projects such as major highways, bridges and tunnels, and multi- year road maintenance contracts. Well-planned road investments generally generate high social returns, and so should receive support from Development Financial Institutions (DFIs), whether the roads are to be managed by public or private operators. In ***railways***, private financial markets are likely to support private participation in profitable (predominantly) freight lines. For larger ***ports and airports,*** the model usually favored by DFIs is that of a public corporatized and commercially run “landlord” port with private provision of port related services.

In the case of ***urban mobility*** segmented by collective (i.e., public urban transportation), individual (i.e., owned car and sharing arrangements), and freight, the focus of this section will be in public urban transportation. Private sector can play a role in the provision of UPTS services and could become important sources of financing for the required expansions and upgrades in public urban transport infrastructure (i.e., Metro systems, trams, light rail systems, BRTs, etc.). However, mitigation of affordability risks implies the need for relatively large amounts of public support to allow for private capital to flow to these types of projects (i.e., availability payment plus variable charge per passenger). This feature limits the potential options for private sector participation in the provision of the service to those options in the performance based private provision of a public service. These options are in the sphere of public private partnership arrangements where the contracting authority -- *the local government in the case of cities with responsibility for the sector* -- contracts the provision of the service with the private sector based on performance-based payments.

In competitive markets private firms are likely to demonstrate performance superior to public firms. In non-competitive markets, the overall effectiveness of private firms is dependent on the effectiveness of regulation. In this context, market definition is important. Market structure reform entails the separation of competitive sub-sectors from remaining natural monopoly sub-sectors. Competition is the strongest force for ongoing improvement in business performance. In some infrastructure areas such as telecommunications or electricity generation, competition may occur "within the market;" (i.e., where there are multiple firms that compete with each other to gain market share). Competition within the market provides firms with incentives to lower their prices, improve service quality and expand their client base. Alternatively, competition "for the market" can be used where multiple firms are not feasible (i.e., where the sub-sector is a natural monopoly). Examples include distribution networks in water, gas, or electricity. In these areas, local governments may auction the right to serve the market. When the auction is carefully designed and executed, the winning firm should be the most efficient bidder. A problem with competition for the market is that the pressure it applies is not constant. It is in force at the time of the auction, but as the competitive moment recedes into the past the benefits of the initial contest decrease (at the end of a 30-year concession period, there is no guarantee that the incumbent is still the most efficient firm in the industry)[18].

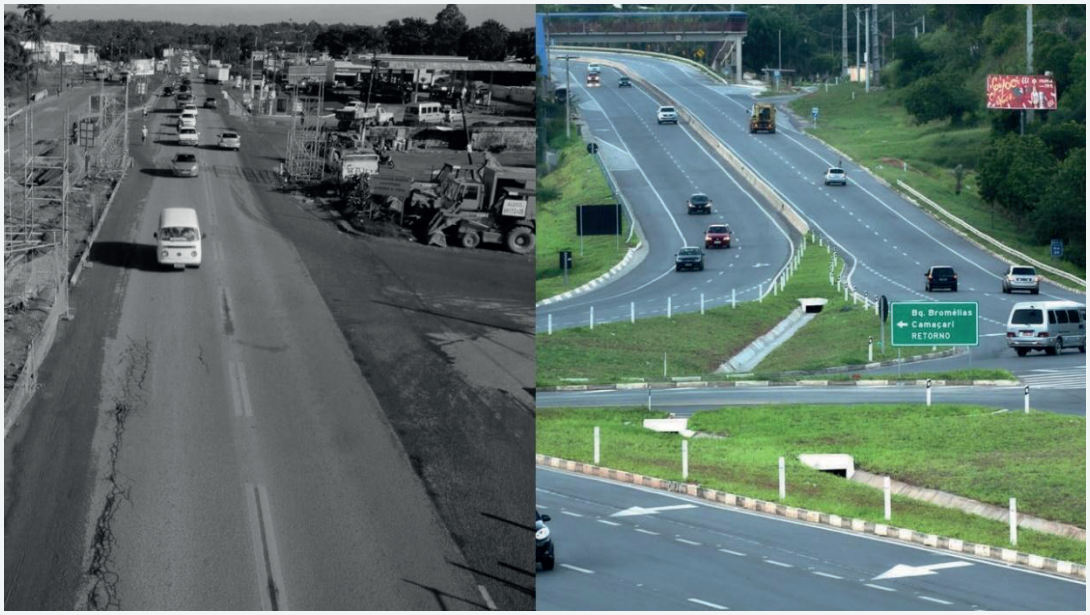
Public urban mobility is, by definition of location and space, considered a natural monopoly in the provision of the urban infrastructure service (i.e., one single track line to provide light rail, tram, bus, or cable car service). Competition is only possible in the modes of urban mobility closer to the personal use (i.e., taxis, and ride sharing arrangements), and freight services. This lack of competition also explains why economic regulation of this sector is often complex and requires strong institutional capacities.

BA-093 highway system Bahia, Brazil

In Northeast Brazil, the BA-093 highway system of Bahia that covers around 126 kilometers, was in critical condition and negatively affecting the region's economy. With heavy traffic and crucial industrial connections, its unsafe condition resulted in accidents, economic losses, and rerouted exports. The PPP for this system became a groundbreaking initiative— the first to cover an entire highway system and a metropolitan area while adhering to sustainability principles.

18 Competition requires the possibility that firms can fail and disappear; this is more easily tolerated in markets where there are multiple private providers of the good or service. In sub-sectors where competition is possible, it should be introduced and protected, and preference given to the private sector. This is now generally the case in telecommunications, where technological advances have made almost all parts of the sector subject to competitive forces. World Bank, Infrastructure Development: The Roles of the Public and Private Sector, November 2005.

Figure No. 16, BA-093, Bahia, Brazil (before and after)



Source: 2020. Concessionária Bahia Norte completa 10 anos de atuação no Sistema BA-093. Estradas.com.br. https://estradas.com.br/concessionaria-bahia-norte-completa-10-anos-de-atuacao-no-sistema-ba-093/

The concession involved a Bahia Norte consortium, a key player in taking the responsibility for rehabilitating, maintaining, and expanding the roads for 25 years. This consortium, led by Invepar and Odebrecht, offered a competitive tariff, leading to substantial private investment. On the other hand, multilateral development banks, like BNDES, IDB, and IFC, played a crucial role in advising the government on structuring the concession:

Financial Expertise and Support: BNDES played a crucial role in providing financial expertise and support. They helped in structuring the financial model for the PPP, offering insights into funding mechanisms, risk assessment, and financial viability of the project. BNDES leveraged its financial acumen to optimize the financial arrangements for the concession, ensuring that it attracted private investment and was economically sustainable.
Engineering and Viability Studies: The IDB contributed by providing expertise in engineering and viability studies. They played a key role in conducting technical assessments of the BA-093 highway system, evaluating its condition, rehabilitation needs, and expansion requirements. The IDB's insights helped in designing a comprehensive plan for the project, ensuring that it met the necessary technical standards and requirements.
Concession Structuring and Advisory Services: The IFC, being the private sector arm of the World Bank Group, offered advisory services in the structuring of the concession. They provided insights into the optimal design of the concession agreement, environmental and social sustainability aspects, and helped draft the tender documents and concession contract. The IFC's expertise ensured that the concession was structured in a manner that attracted private sector interest and aligned with international best practices.

The outcomes promise significant improvements—enhanced road conditions, reduced accidents, and bolstered security. The project's success also demonstrates a model for urban tolls, setting an innovative precedent for future initiatives across Brazil. The improvements in the BA-093 highway system were received positively by the local communities due to the overall enhancement of their daily lives, increased safety, economic benefits, job creation, and a commitment to sustainability. The upgraded highway system significantly enhanced transportation and accessibility, what directly improved the quality of life for local residents by saving time and reducing travel-related stress. Also, the repairs and maintenance of the road led to reduced accidents and increased safety for both commuters and pedestrians, but also support and was developed with environmental and social sustainability standards.

The BA-093 highway system has been crucial for the local economy, connecting industrial hubs, ports, and major logistical areas. The improvements facilitate the transportation of goods and materials, benefiting businesses and contributing to economic growth. This also produced employment opportunities and increased economic activities, not only during the construction phase, but afterward for maintenance and operational purposes.

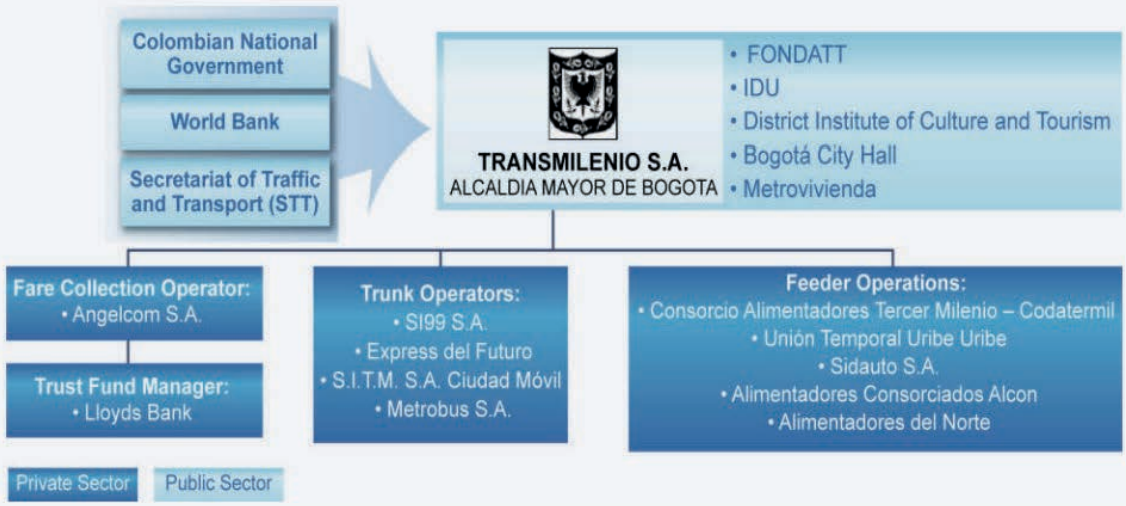
Figure No. 17, BA-093, Bahia, Brazil (today)

Source: CN1. (n.d.). Rodovias do Sistema BA-093: Bahia Norte divulga série de intervenções programadas para esta semana. https://www.cn1.com.br/noticias/20/96426,rodovias-do-sistema-ba-093-bahia-norte-divulga-serie-de-intervencoes-programadas-para-esta-semana.html

Transmilenio – Bogotá, Colombia

As was mentioned before, Transmilenio, the Bus Rapid Transit (BRT) system in Bogota, serves as a model of a successful public-private partnership (PPP) in urban transportation. Established in 1999, TransMilenio S.A. was created as a result of a partnership, delineating the roles and responsibilities clearly: the public sector was charged with investing in and developing the necessary infrastructure, while the private sector took on the mantle of operating and maintaining the system. This collaboration marked a fundamental step in transforming the city's mass transit landscape.

Figure No. 18: TransMilenio Institutional Framework and Governance Structure[19]



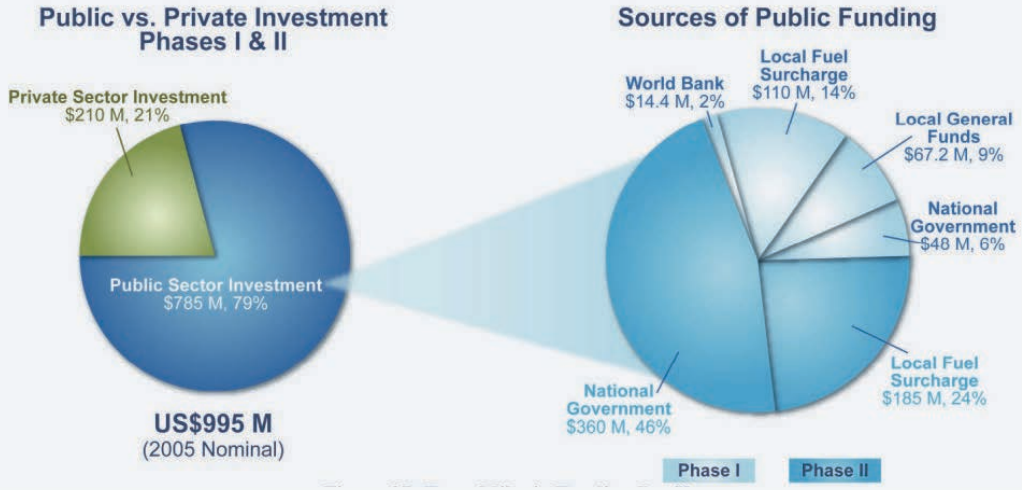
Source: Foreign Public Private Partnership (PPP) Study Analysis Report, Federal Transit administration, U.S. Department of Transportation (2009).

One of the remarkable aspects of TransMilenio is its phased development, meticulously planned and executed. The first phase, completed in 2000, covered 42 kilometers. Phase 2, a massive expansion effort, added 131.4 kilometers of busways, progressively completed in 2006, 2012, and 2015. Currently, Phases 3 and 4 are undergoing feasibility studies. The system features dedicated bus routes, large-capacity buses, and elevated bus stations. Looking ahead, by 2024, plans are in place to integrate a metro train system, further expanding the network by 388 kilometers.

In terms of financing, TransMilenio has an estimated total cost of US $995 million (2005 USD). A significant portion, 79%, is funded by the public sector, with the remaining 21% secured from the private sector. The funding structure involves debt and equity financing. The public sector's contribution for Phase I and II totaled approximately $240 million and $545 million, respectively, combining various sources, including grants, loans, and local revenue channels.

19 https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/funding/funding-finance-resources/private-sector-participation/114921/ppp-foreign-case-studies-report-09152009.pdf

Figure No. 19: TransMilenio, Project Funding Structure

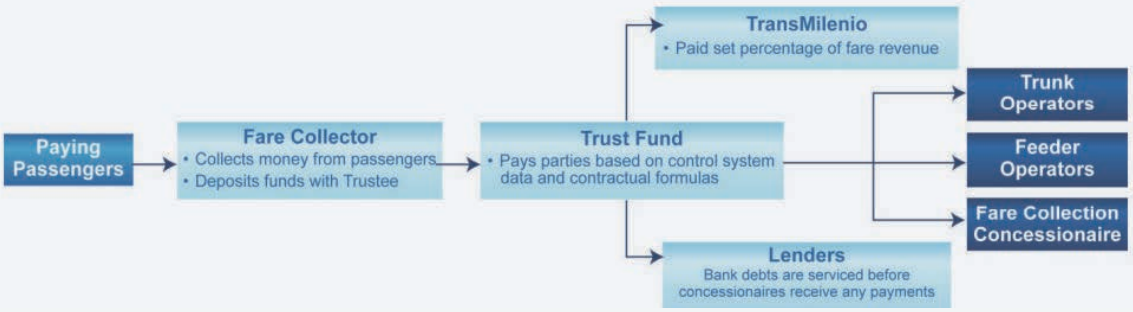


Source: Foreign Public Private Partnership (PPP) Study Analysis Report, Federal Transit administration, U.S. Department of Transportation (2009).

he significance of TransMilenio extends beyond transportation—it is a key player in fostering a more inclusive society. Evolving from its original mission of providing mass transport services, TransMilenio has actively engaged with various agencies to lead the inclusivity agenda for the citizens of Bogotá. In recent years, the system has adopted inclusive and socially responsible practices, promoting values such as civility, empathy, tolerance, and solidarity among passengers and citizens.

Additionally, TransMilenio boasts a unique revenue management mechanism, ensuring the equitable distribution of funds generated from ticket sales. This meticulous approach supports the sustainable operation and growth of the system. The public sector does not directly handle revenues. When passengers buy their tickets at fare collection stations, the funds collected are then channeled to a Trust Fund operator daily. This Trust Fund operator holds the responsibility of distributing these funds according to the stipulated terms and conditions of the concession agreements, ensuring a smooth flow to TransMilenio, lenders, and concessionaires.

Figure No. 20: Transmilenio, Project Cash Flows



Source: Foreign Public Private Partnership (PPP) Study Analysis Report, Federal Transit administration, U.S. Department of Transportation (2009), Page 61

TransMilenio provides valuable lessons for efficient and effective public transportation projects. One crucial lesson is the advantage of combining trunk and feeder concessions in BRT operations. This approach helps spread risks like ridership and scheduling across the system, reducing administrative costs. Another significant lesson is the necessity for the governing authority to have control over bus routes across the entire system. By phasing out old bus routes and maintaining route authority, the system can achieve expected efficiencies. This emphasizes the need for strong political leadership in PPP projects, and the political support is crucial for project advancement.

Forming a dedicated public sector governing entity for project implementation proves beneficial. This entity acts as the project's advocate, coordinating with various public sector stakeholders and focusing solely on successful project delivery. Additionally, risk transfer to the private sector is a key advantage of PPPs, allowing steady funding planning for the public sector. Lastly, incorporating specific performance penalties encourages high-quality service provision. It's essential for the public sector to have mechanisms in place to recoup or retain penalties associated with unsatisfactory performance, ensuring service standards are met. These lessons from TransMilenio underscore the importance of strategic planning, efficient governance, and risk management in transportation projects.

Annex No. 1

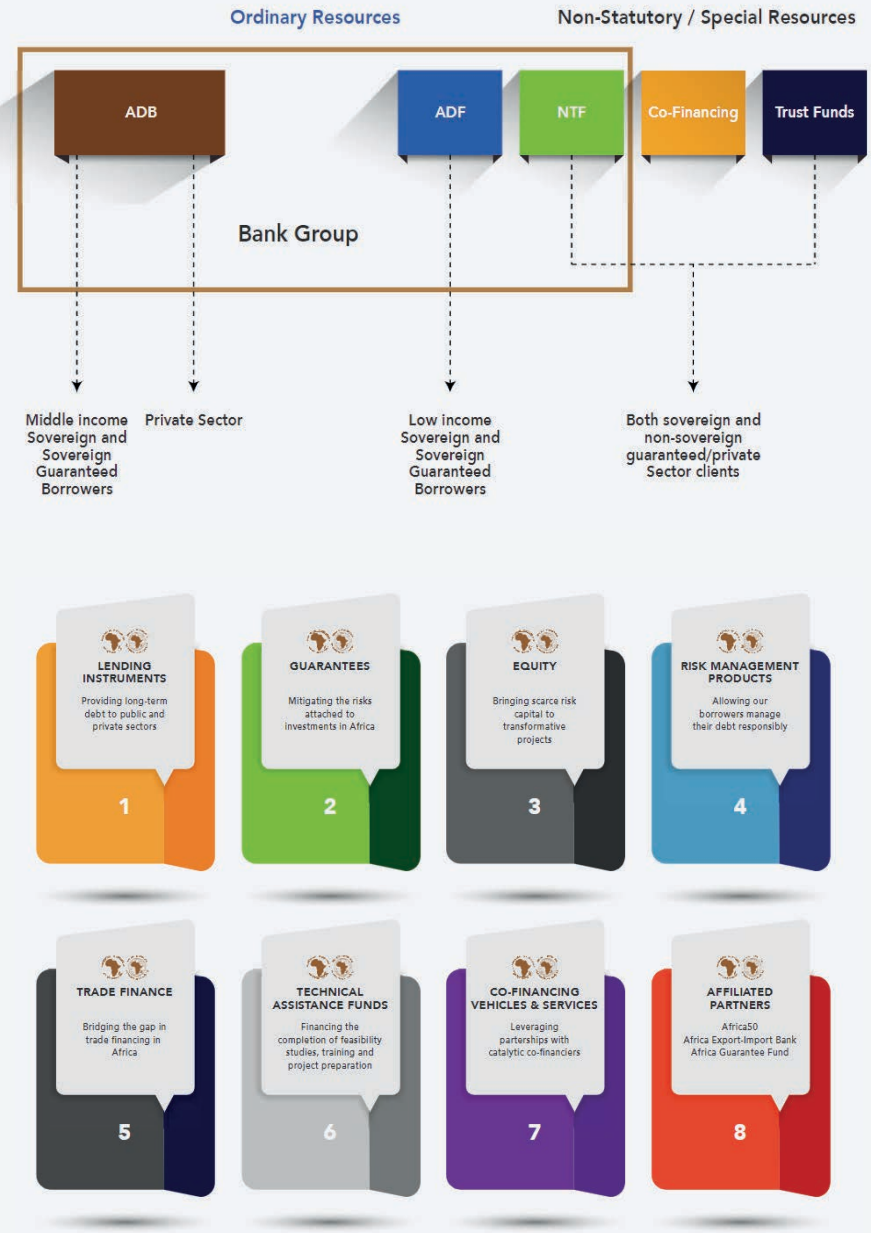
Overview of African Development Bank Group (AfDB) Resources and Financial Products

Funding Sources

The AfDB Group is made up of three legally separate financing windows namely, the African Development Bank (ADB), the African Development Fund (ADF), and the Nigerian Trust Fund (NTF) which were set up to address the diverse financing needs of the continent. The ADF and NTF are concessional financing windows accessible to low-income countries while the ADB is the non-concessional financing window accessible to middle income countries, the private sector and some ADF eligible countries. Through these windows, the Bank provides a wide range of financing products: (i) Lending instruments: (ii) Risk management products; (iii) Guarantees; (iv) Equity; (v) Trade finance; (vi) Technical assistance funds – trust funds in form of grants, concessional loans, equity in select cases and reimbursable grants; and (vii) Partnerships – syndication and co-financing e.g., with the Africa Guarantee Fund, Africa Export-Import Bank.

Eligibility to specific financing windows and instruments is determined by the country's classification. Countries and their subnational governments classified under Category A are considered ADF only countries and are eligible for ADF and NTF concessional windows only. Lending terms for these countries will depend on the GNI per capita relative to the average GNI per capita of ADF only countries and level of debt distress. ADF loans would be guaranteed by the State. Countries and their subnational governments classified under Category B are eligible for both ADF concessional and ADB non-concessional windows. This has significantly increased the amount of loan resources available to borrow for such countries from both ADF and ADB windows.

Figure No. 1: AFDB Financing Mechanisms for Sustainable Infrastructure



Source: UMDF/AfDB, October 2023

The AfDB also works as the implementing agency for a number of climate funds, such as the Global Environmental Facility (GEF) and the Green Climate Fund (GCF). Grants or loans from climate funds are used as co-financing for a Bank financed project e.g., a transport, water, and sanitation infrastructure project. More recently, the GEF has co-financed the Kampala City Road Rehabilitation Project in Uganda, the Dodoma City Outer Ring Road Project in Tanzania among others. A separate project document is prepared for each of the climate financed projects that requires approval by the Climate Fund and the Bank Board of Directors. Implementation of Climate Funds uses the same implementing procedures as the rest of Bank financing. While GEF financing is typically granted to countries, the GCF is in the form of low concessional loans.

Financial products provided for urban infrastructure projects.

In the case of urban infrastructure projects, the Bank group has previously only considered Sovereign and Sovereign Guaranteed Borrowers. With the exception of South Africa's metropolitan cities, African cities have not been able to borrow on their own balance sheets. This is because in many countries, the legislation and regulatory framework in place is either limited in its allowance of cities to borrow without Sovereign Guarantee or does not allow independent access to debt by municipalities. Furthermore, many cities have not received a positive credit rating, or are not deemed creditworthy. In an attempt to improve this situation, the Bank Board of Directors approved the first and possibly only existing among MDBs, "the Guidelines for Subnational Finance," which allow the Bank to lend directly to Subnational entities such as cities, and other local governments. But this is only possible under certain conditions, among them, the creditworthiness of those Subnational entities. The Bank is supporting the development of a number of initiatives under the umbrella of "Municipal Finance" aimed at improving municipal finances and the creditworthiness of cities.

Recently in 2019, the Bank launched the ***Urban and Municipal Development Fund,*** a Multi-donor trust fund dedicated to sustainable development of cities. For the next 4 years, the Trust Fund will support four key areas, (i) the Africa Cities Program; (ii) the Project Preparation Work; (iii) Municipal Finance; and (iv) other Technical and Capacity Building Assistance. The Cities Program is aimed at improving sustainability at the city level to better adapt to the urban development demands of the next few decades while providing technical assistance to bridge the gap between governance, urban planning, and infrastructure and social services investments. The Cities Program aims to make cities an integral part of the solution in fighting climate change.

References

Review of Public Transportation Economics, Horsher-Tirachini, January 2021. Urban Transportation Economics, Kenneth Small, 2007.
Mobile Metropolises, World Bank, IEG, 2017.

- Rodríguez, y Vergel 2013 Sistemas de transporte público masivo tipo BRT (Bus Rapid Transit) y desarrollo urbano en América Latina Lincoln Institute of Land Policy https://www.lincolninst.edu/publications/articles/sistemas-transporte-publico-masivo-tipo-brt-bus-rapid-transit-desarrollo.

Yañez-Pagans et al. Lat Am Econ Rev (2019) Urban transport systems in Latin America and the Caribbean: lessons and challenges.
https://blogs.worldbank.org/ppps/decade-ppps-latin-america-and-caribbean-what-have-we-learned.
World Bank, Infrastructure Development: The Roles of the Public and Private Sector, November 2005.
Economics of Public Urban Transportation, Horscher-Tirachini, January 2021.
Urban Public Transport System, Routledge, 2019
Political Economy of Urban Public Transport in Africa and the Role of the World Bank, 2023. Friedrich-Ebert-Stiftung, Trade Union Competence Centre for Sub-Saharan Africa, 2023.
C40, how to make public transport attractive? 2019
Rethinking Urban Mobility, Carnegie Endowment for International Peace, 2013
McKinsey, The Future of Mobility, 2017
Smart Mobility PPP's in LAC, The Economist, IDB, 2014

- 2020. Concessionária Bahia Norte completa 10 anos de atuação no Sistema BA-093. Estradas.com.br. (https://estradas.com.br/concessionaria-bahia-norte-completa-10-anos-de-atuacao-no-sistema-ba-093/)
- Aderibigbe, T., Chan, L., Lewis, S., Oni, T., Rajagopal, D., & Centre for Public Impact. (2021). Making the Case: Colombia Case Studies on Inclusive Economic Development. Centre for Public Impact. (https://www.centreforpublicimpact.org/assets/pdfs/b4a/mcg-23003b-b4a-colombia_v3.pdf)

Asia-Pacific Economic Cooperation Secretariat. (2017, April). Partnerships for the Sustainable Development of Cities in the APEC Region.

- Assallo, J. M. (2018). Public-Private Partnership in Latin America: Facing the Challenge of Connecting and Improving Cities [PDF]. CAF - Development Bank of Latin America. (https://scioteca.caf.com/bitstream/handle/123456789/1549/Public-Private_Partnership_in_Latin_America._Facing_the_challenge_of_connecting_and_improving_cities..pdf)

CAF. (2018). PPPs in LAC, Connecting Cities: The Case of Santiago Urban Highways.

- C40 Cities. Sustainable Mobility in Buenos Aires. (https://www.c40.org/case-studies/sustainable-mobility-buenos-aires/)

Chauliac, P. (2023, September). Cable Car PPPs: Financing Sustainable Transport Solutions for Latin America. Financier Worldwide Magazine.

- Cota, I. (2023). Inclusion and transparency: The challenges of public-private partnerships in Latin America. El País. (https://english.elpais.com/economy-and-business/2023-07-19/inclusion-and-transparency-the-challenges-of-public-private-partnerships-in-latin-america.html)
- Fiori de Abreu, A. (2017). PPP Models Address the Region's Urban Challenges. Bidlab. (https://bidlab.org/en/news/282/ppp-models-address-regions-urban-challenges)
- Foreign Public Private Partnership (PPP) Study Analyss Report, Federal Transit administration, U.S. Department of Transportation (2009). (https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/funding/funding-finance-resources/private-sector-participation/114921/ppp-foreign-case-studies-report-09152009.pdf)
- Gobierno del Estado de Jalisco. MiMacroTeleferico. (https://mimacro.jalisco.gob.mx/)
- Global Infrastructure Hub. TransMilenio Bus Rapid Transit, Colombia [Case Study]. Inclusive Infrastructure. (https://inclusiveinfra.gihub.org/case-studies/transmilenio-bus-rapid-transit-colombia/#foot-ref-3)
- ICLEI - Local Governments for Sustainability. (2022). Curitiba, Brazil. Ecomobility Alliance. (https://sustainablemobility.iclei.org/ecomobility-alliance/curitiba-brazil/)

IDOS. (2022). Sector Public Transport Solutions in LAC.

- Jaffe, E. (2012). Why Are People Rioting Over Bogota's Public Transit System? CityLab. (https://www.citylab.com/transportation/2012/03/why-are-people-rioting-over-bogotas-public-transit-system/1537/)

McKinsey. (2021). PPP Collaboration Transforming Urban Mobility.

- Metropolitan Company of São Paulo (Metrô-SP). Bilhete Único. (https://www.metro.sp.gov.br/sua-viagem/bilhetes-cartoes/bilhete-unico/)
- Metropolis. TransMilenio Bus Rapid Transit System. Metropolis Case Studies. (https://use.metropolis.org/case-studies/transmilenio-bus-rapid-transit-system)
- Michelitsch, R., & Szwedzki, C. (2017). A Decade of PPPs in Latin America and the Caribbean: What Have We Learned? World Bank Blogs. (https://blogs.worldbank.org/ppps/decade-ppps-latin-america-and-caribbean-what-have-we-learned)
- Latin America's electric bus (and PPP) embrace. Bnamericas. Published: Thursday, July 14, 2022, By Jessica Springsteen (https://www.bnamericas.com/en/opinion/latin-americas-electric-bus-and-ppp-embrace)
- Patel, D. (2017). What Can Other Cities Learn from Mexico City's Bike-Sharing Scheme? LSE International Development Blog. (https://blogs.lse.ac.uk/internationaldevelopment/2017/12/08/what-can-other-cities-learn-from-mexico-citys-bike-sharing-scheme/)
- Rodriguez, D. A., & Vergel Tovar, E. (2013). Sistemas de transporte público masivo tipo BRT (Bus Rapid Transit) y desarrollo urbano en América Latina. Lincoln Institute of Land Policy. (https://www.lincolninst.edu/sites/default/files/pubfiles/2210_1537_sistemas_de_transporte_publico_massivo_tipo_brt_0113llsp.pdf)
- Sao Paulo Map 360. São Paulo Metro Map. (https://saopaulomap360.com/s%C3%A3o-paulo-metro-map)
- Scholl, L., Guerrero, A., Quintanilla, O., Celse L'Hoste, M., & Sadeghi, P. (2015). Comparative Case Studies of Three IDB-Supported Urban Transport Projects. Inter-American Development Bank. (https://publications.iadb.org/en/comparative-case-studies-three-idb-supported-urban-transport-projects)
- Springsteen, J. (2022). Latin America's Electric Bus (and PPP) Embrace. Bnamericas. (https://www.bnamericas.com/en/opinion/latin-americas-electric-bus-and-ppp-embrace)
- World Bank Group. (2022). Multilateral Development Banks' Collaboration: Infrastructure Investment Project Briefs, Brazil: BA-093 Highway System [PDF]. (https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2022-02/BrazilBA093HighwaySystem_WBG_IDB_PRINT.pdf)
- World Bank Group. (2022). Transportation Toolkits. Public-Private Partnership. (https://ppp.worldbank.org/public-private-partnership/sector/transportation/toolkits)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