

Case Study: Colombia's Bus Rapid Transit (BRT) Development And Expansion

*An Analysis of barriers and critical
enablers of Colombia's BRT systems*

Produced for the Mitigation Action Implementation Network (MAIN)

January 2012

Written by:

Michael Turner
Chuck Kooshian
Steve Winkelman

Supported by:
German International
Climate Initiative



Acknowledgements

This paper is a product of CCAP's Mitigation Action Implementation Network ([MAIN](#)) and was written by Michael Turner, Chuck Kooshian, and Steve Winkelman of CCAP.

This project is part of the International Climate Initiative. The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety supports this initiative on the basis of a decision adopted by the German Bundestag.

Special thanks are due to the individuals in Colombia who offered their time and assistance, through phone interviews or in-person discussions to help inform this work. They include Juan Jose Castillo Lugo and Julián Andrés Gómez of the Ministry of Transport, Sandra López and María Cecilia Concha of the Ministry of the Environment, Miguel Uribe of the Department of National Planning, Guillermo Herrera Castaño of the Ministry of Housing, Carlos Felipe Pardo of GIZ, and Oscar Diaz of GSD+.

The views expressed in this paper represent those of CCAP and not necessarily those of any of the other institutions or individuals mentioned above. For further information, please contact Michael Turner (mturner@ccap.org).



Supported by:



based on a decision of the Parliament of the Federal Republic of Germany

Table of Contents

Acronyms.....	4
Overview.....	5
The Story in Bogotá, Colombia	6
TransMilenio.....	8
Colombia’s National Plan	11
Support and Funding	11
Institutional Framework.....	13
Environmental Benefits	14
Way Forward	14
Experience and Lessons from Pereira, Colombia	15
Cali, Colombia- Masivo Integrado de Occidente (MIO).....	17
Peer-to-Peer Learning	18
Conclusion	20
References.....	21

Acronyms

BRT	Bus Rapid Transit
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO ₂	Carbon Dioxide
DNP	Departamento Nacional de Planeación
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GPS	Global Positioning System
IMTS	Integrated Mass Transit System
MIO	Masivo Integrado de Occidente
NAMA	Nationally Appropriate Mitigation Action
NQS	Avenida Norte-Quito-Sur
NO _x	Nitrogen oxide
NUTP	National Urban Transport Program
Ppm	Parts per million
SPTS	Strategic Public Transportation System
TOD	Transportation Oriented Development
SO ₂	Sulfur Dioxide
VER	Voluntary Emission Reduction



Colombia's Bus Rapid Transit (BRT) Development and Expansion

A Case Study of barriers and critical enablers of Colombia's BRT systems

Overview

Many major cities in Colombia struggle with managing transportation issues arising from growing populations and vehicle use and the development of sustainable public transportation alternatives. Rapidly developing metropolises suffer from highly congested roadways, extreme air pollution, and high rates of road related accidents. In Colombia, these issues stem partly from the over-saturation of independent bus operators, underinvestment in infrastructure and inefficient operations. In 2002, Colombia championed the National Urban Transport Program (NUTP) that revolutionized the public transport system; implementing Strategic Public Transportation Systems (SPTS) and expanding Bus Rapid Transit (BRT) systems in major cities. In the process, Colombia had to overcome a variety of significant barriers. Some of these main challenges were as follows:

- Low public opinion of busways and bikelanes before the year 2000. This required a shift in thinking about urban space, the relationship between motor vehicles and pedestrians, and the image of public transport.
- Intense opposition for BRT development from existing bus operators, especially bus owners as they feared loss of income. In Colombia, "War of the Pennies" is a term used to describe the fierce competition that occurred among buses and small buses, which resulted from a dysfunctional permitting and incentives program. A BRT system seemed to further threaten the market share of the bus owners and operators.
- Interference from non-project participants within government slowed development plans.

- Competing goals for the transportation system; the transportation department valued rider comfort and satisfaction while private bus companies and drivers wanted to maximize profits.
- There was resistance to raising the low costs of public transportation to levels that would cover all operating and maintenance costs for the contractors without subsidies.
- Tight city and national budgets meant that well-executed transportation plans and strategic financing models were necessary to develop cost-effective transportation systems.
- Unfavorable experiences in busway-like projects (i.e. Caracas busway) in the mid-1990s.

The first BRT system, TransMilenio, was built in Bogotá. It was so successful that it became a model for the rest of the country. Among other things, it decreased the average travel time by 32%, increased property values along the main line by 15-20%, enhanced tax revenues, created jobs, and improved the health and safety of the community. TransMilenio helped galvanize support for the national plan to expand BRT systems to 8 other cities in Colombia. Through impressive leadership, strategic institutional coordination and innovative financing models that included funding from public, private, and international institutions, Colombia was able to address these barriers and build a national plan to expand Bus Rapid Transit systems across the country.

This case study describes the challenges and successes of Colombia's national effort to build Strategic Public Transportation Systems and to expand Bus Rapid Transit to major cities across the country. The national plan was rooted in the success of Bogotá's TransMilenio and has already been successfully replicated in cities like Pereira and Cali. Colombia's approach could be reproduced in other developing countries as they search for ways to address transportation and Greenhouse Gas (GHG) challenges through development of BRT systems.

The Story in Bogotá, Colombia

Colombia's capital city of Bogotá is the largest and most populous city in the nation, with an estimated population of 8.35 million in the metropolitan area in 2007 and a high population density. The political and financial capital of the country, and accounting for 25% of Colombia's total gross domestic product (GDP); Bogotá is the most important city in Colombia.

Bogotá experienced significant growth in private car ownership and use in the past two decades, causing high accident rates, extremely severe air pollution during peak travel hours, and long commuting times. Mass transit options, limited to privately owned public bus service, suffered from the oversupply of bus route permits, inadequate institutional capacity, and a fractured owner/driver relationship, which resulted in fleet oversupply, low quality services and high social cost due to slow travel, high pollution, high accident rates, and operating inefficiency. In the late 1990's, Bogotá's public bus transportation system was dangerous, underused, inefficient, and offered poor quality service.

In the last decade Bogotá has completely transformed its public transit system and it is now heralded as a model for effectively moving a developing country city's transportation system toward sustainability. This process demonstrated how transportation and urban form can contribute to improving the level of civic engagement, creating a more efficient, equitable and sustainable city.

The initial groundwork was laid by Mayor Antanas Mockus (1995-1997, 2001-2003), whose program was to raise consciousness about public interactions. Mockus began an important change in Bogotá's civic culture with his *Cultura Ciudadana* (Citizen Culture) campaign, which encouraged civic behavior and strived to create a sense of belonging for the inhabitants of the city. Part of his curriculum involved traffic etiquette and this led to changed attitudes about the relationship between motor vehicles and pedestrians. Through the use of such unorthodox techniques as mimes, thumbs-up or thumbs-down placards and re-organizing the traffic police, attention was drawn to the disutility of every-person-for-themselves attitudes. This change in attitude set the stage for increased investment in public transit and non-motorized infrastructure.

The next administration, under Enrique Peñalosa (1998-2001), introduced a comprehensive effort to transform the way residents traveled around the city. This program involved the integrated use of a number of strategies. Peñalosa's stated focus was on creating a more egalitarian society, improving quality of life income levels, increasing productivity, and reducing congestion, all of which entailed reducing the emphasis on investment to support private automobiles. There were three main pillars of the transformation: education on public awareness of transit and non-motorized travel options, planning and constructing Bus Rapid Transit and bike infrastructure, and restrictions on automobile use.

TransMilenio



TransMilenio bus and dedicated bus lane (photo from TransMilenio official website)

For years Bogotá had a transportation master plan that included a rail transit system (a metro), but has never been built. In the early 1990's the metro idea was dropped and a busway was constructed along a downtown street, Caracas Avenue. The busway was open to any of the thousands of private buses that ran all over Bogotá. Peñalosa initially backed the master plan with a mass transportation system, getting the national government agreement to fund 70% of it. By the end of 2000, TransMilenio Phase 1 opened, transforming the Caracas busway into a BRT system and opening another corridor (Calle 80). He also left a third corridor under construction. This Bus Rapid Transit system had capacity and speed comparable to most metro systems and was able to move 46,000 passengers per hour per direction at peak times in the Caracas Avenue corridor. Along with the BRT construction, Peñalosa instituted measures to improve the urban environment. The government relocated informal vendors who occupied the public zones and streets, improved all the city parks and constructed several new ones, renovated some of the most important avenues of the city, and stopped the parking of cars on sidewalks by raising sidewalks and installing bollards.

Total investment for the 41 kilometers of Phase 1 was US \$213 million, funded with a local 25% fuel surcharge (46% of investment), general local revenues (28% mainly from a capital reduction from the partially privatized power company), grants from the National Government (20%), and a loan from the World Bank (6%). In 2006, at a cost of US \$245 million, Phase 2 added 43 km of exclusive BRT corridors. The first phases of the BRT system

included feeder routes leading into the BRT corridors and a new integrated fare card system to allow free transfers. Phase 3 is under construction and more corridors are planned, which will expand the length of the busways to 388 km.

OPPOSITION FROM TRANSPORT INDUSTRY LEADERS

The reaction of traditional bus companies to the proposal of a BRT system in Bogotá was negative. A main cause of resistance from existing bus operators was the feared loss of business. However other issues ensued such as the replacement of direct permitting allocation with a bidding process, the huge financial risk involved with investments in bus acquisition, and the uncertainty of the government being able to follow through with building planned infrastructure and retiring existing operators. These factors caused existing operators to strongly oppose the implementation of TransMilenio and proved to be a critical barrier to the BRT's success. Several methods were employed by city agencies to overcome the resistance of bus operators and make them pertinent stakeholders in the planning and implementation of TransMilenio. First, the Terms of Reference included experience in public transportation in the city as a prerequisite, which basically secured the participation of bus companies in the bidding process (and bus owners in Phase II). In fact 59 out of 64 companies become share holders of the bidding companies, but the mass transit system was only controlled by a few of these companies. Second, open dialogues with transport companies were held in order to include them in the relocation of routes and the negotiations of terms and conditions of contracts. These tactics were instrumental in overcoming the initial strong resistance from existing bus operators and getting them to become shareholders in the new BRT system.

The TransMilenio system is managed by a public transit authority, Transmilenio, S.A., which awards contracts to private bus companies on a competitive basis. The government is responsible for the busway and station infrastructure while different private companies buy and operate the busses, provide the drivers and a separate company collects the fares. Trunk operators are paid based upon a formula where the most important factor is the total number of kilometers that their vehicles operate; feeder bus operators are paid based on the number of passengers. Companies were required to buy busses that met the standards of the program. Traditional busses are banned from the TransMilenio corridors. The project replaced over 9,000 old inefficient buses with over 1,200 large capacity centrally fleet managed modern buses.

The TransMilenio project has been able to generate significant carbon revenue through the sale of both Voluntary Emission Reductions (VERs) and Certified Emission Reductions (CERs). VERs were received beginning in 2001 with Phase I, while CERs were received from 2006

onwards with the start of Phase II. TransMilenio earned the distinction of becoming the world's first mass transit project registered with the UNFCCC for Clean Development Mechanisms (CDM) credits in 2006. The project generated 277,044 Certified Emission Reduction credits under the Kyoto Protocol's CDM for 2006-2009, which were sold to provide additional funding for bus purchases. The expected additional income from the sale of CER credits is US \$25 million by 2012 (assuming a total estimated reductions of 1,725,940 tCO₂eq is achieved in the first crediting period 2006-2012 and price of US \$14.5/tCO₂).

TransMilenio, S.A. operates the Control Center, equipped with 12 workstations, each able to control 80 articulated buses, which allows planning and real time supervision of bus operations. Each bus has a computer connected with a GPS, the odometer and the door opening system. The computer reports the location of the bus each 6 seconds with a 2 meter precision. The control operators have a monitoring screen for each service in schematic display and a digital map that shows the physical location of the buses. The software is able to verify schedule compliance, giving the controllers the opportunity to make demand and supply adjustments in real time. Real time service information is displayed on electronic boards inside each bus.

Ridership in 2011 was 1,750,000 daily, about 25% of all transit trips in Bogotá. Average travel time for Bogotá residents has gone down by about 20 minutes (-32%) since before the system was built. There have also been significant reductions in collisions and traffic fatalities. The BRT is credited with improvements in the civil culture of the city, generating increased respect among the public, and a creating sense of belonging for lower economic strata. It has also led to a transformation and consolidation of certain areas for urban development. A study by the Urban Land Institute in 2008 found that property values around TransMilenio stations have a 15 to 20% price premium over other areas in the city.

Colombia's National Plan

The success of Bogotá's TransMilenio system helped spur support for the development of a national plan for Integrated Mass Transit Systems (IMTS) that would replicate the Bogotá example in other parts of the country. The National Urban Transport Program (NUTP) offers funding and support to cities with populations of over 600,000 inhabitants to develop Integrated Mass Transit Systems and cities with populations between 300,000 and 600,000 to develop Strategic Public Transportation Systems (SPTS). This legislation resulted in the planned extension of BRT projects in 8 other cities:

- Barranquilla Metropolitan Area (Transmetro)
- Bogotá-Soacha (TransMilenio extension)
- Bucaramanga Metropolitan Area (Metrolinea)
- Cartagena (Transcaribe)
- Pereira-Dosquebradas (Megabus)
- Santiago de Cali (Mio-Metrocali)
- Valle de Aburra-Medellin (Metroplus)
- Cúcuta (Metrobus)¹



Support and Funding

In 2002, the Colombian government developed a national urban transportation policy in an effort to improve public passenger transportation service in the country. This public policy, executed through the National Urban Transportation Program (NUTP), is designed to (i) institutionally strengthen cities in traffic and transportation planning, management, regulatory oversight, and control; (ii) encourage cities to implement transportation systems that address

¹ Cúcuta did not initially qualify, but was later included. It is located in the Northeast part of Colombia.

mobility needs in line with operational, economic and environmental efficiency criteria; (iii) improve the efficiency in the use of private cars in urban areas while offering users fast and comfortable public transportation alternatives; (iv) support urban initiatives for public transportation programs; (v) develop regulatory frameworks aimed at optimizing private-sector participation in and sustainability of transportation systems; and (vi) adapt services to users' needs, valuing user perception of the transportation systems.²

NUTP provides institutional support, training and assistance in traffic and transit planning, management and control. In addition, it will provide money or in-kind support for 40-70% of the total project cost to be used for construction of infrastructure. Most of the funding for the national program comes from loans by Corporación Andina de Fomento (CAF) (US \$45 million for Bogotá's Avenida Suba), the Inter-American Development Bank (US \$200 million for the Cali project), and the World Bank (US \$250 million for the projects in Cartagena, Barranquilla, Bucaramanga, Pereira, Medellín, and Bogotá's Norte-Quito-Sur (NQS)). Additionally, public-private partnerships play an integral part of the national policy. The public sector is principally in charge of the delivery of infrastructure, busways, and stations, and the planning and control of operations. The private sector is contracted to be primarily responsible to acquire and operate the vehicles and some supporting infrastructure like maintenance yards, the fare collection and control systems, and the operations monitoring equipment.

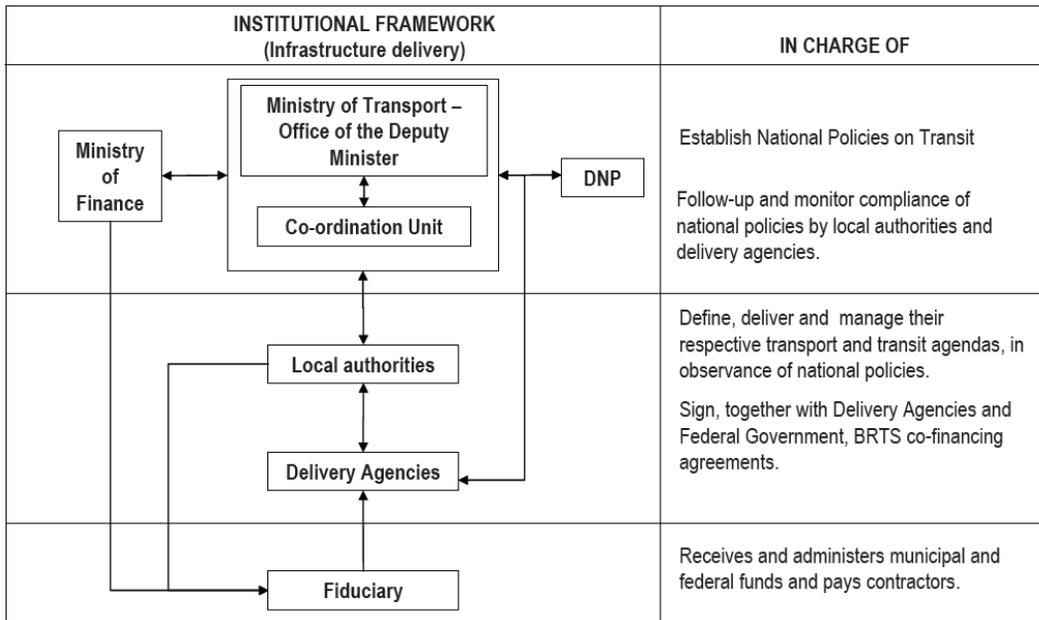
² Loan proposal by the Inter-American Development Bank "Strategic Public Transportation Systems (SPTS)" found here: <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=36479949>

Institutional Framework

The inter-institutional framework for coordination defined by the national plan was adopted by municipal participants and continues to guide the expansion of public transport systems across the country. The following diagram shows the institutional framework for BRT development in Colombia as well as the structure for financial flows.

Institutional Framework for BRT Development in Colombia

Adapted from Sistemas Integrados de Transporte Masivo 2002/2010.



The creation of a Coordination Unit to supervise the implementation of IMTS projects provides a vital part of ensuring a successful project. This separate body acts as an important coordination point and oversees critical technical aspects of the national plan including:

- Administration, finance, and accounting
- Work and acquisitions
- Social management of resettlement
- Environmental management
- Monitoring and evaluations

Environmental Benefits

Before the implementation of BRT programs in cities like Bogota, buses for urban transport systems consumed diesel fuel of more than 4,500 parts per million (ppm) of sulfur. (Diesel fuel quality in Bogotá and Medellín is now 50 ppm and will be countrywide by January 1st 2013 by law.) This type of fuel emits much higher volumes of particulate matter than the fixed national standard, significantly affecting the health of city dwellers and adding to Colombia's carbon emissions. The initiation of a national program to develop IMTS throughout the country brought important environmental benefits. According to government figures this included estimated emissions reductions of close to 1 million tons of CO₂ per year. Tree planting efforts for different mass transit projects throughout the country will collectively produce over 75,000 new trees leading to an approximate additional 800,000 tCO₂e reduction per year. Bogotá reported the following reductions in air pollution after the implementation of TransMilenio: SO₂ declined by 43%, NO_x by 18% and particulate matter by 12%.

Way Forward

Pereira's Megabus was the first system delivered through the national plan. Megabus demonstrates that the TransMilenio model can successfully be scaled down and adapted to metropolitan areas of less than 1 million inhabitants. Operations have been started or planned for all other participant cities. While there are noticeable differences in the design and institutional models of other cities' systems, these projects illustrate that the TranMilenio model can be successfully adapted to other cities while the performance and economic viability of the bus system can remain unaffected.

The following analysis of Pereira's Megabus highlights the success of the national plan and offers valuable intelligence on the successful replication of the TransMilenio model.

Experience and Lessons from Pereira, Colombia



Megabus leaving an aesthetically designed station (photo from Megabus official website)

While Pereira is considerably smaller than Bogotá, with a population of approximately 700,000 people, its integrated BRT system, which opened in 2006, shares many similarities to that of TransMilenio, including dedicated lanes, stations, vehicles, services, and a systems brand: Megabus.

The total capital cost of the infrastructure for Megabus was US \$60 million, of which 70% came from the national government and 30% was financed through a local gasoline tax. Megabus currently carries more than 100,000 passengers per day and this is expected to rise to more than 140,000 when the system is complete. According to the city, Megabus has already led to a 2% mode shift from private cars to transit citywide and about 10% of Megabus users have access to a car.

Megabus, like other BRT systems, faced some of the same critical barriers and challenges in the planning and implementation process that were seen at the national level and in Bogotá including:

- The implementation team lacked experience in BRT planning.
- Changes in the project scope after the design phase delayed the project.
- Initial opposition from existing operators.

- Low public transport fares (US \$0.33) and difficulties to raise them. Final fares were 40% higher than initially expected, because operators were required to cover part of the infrastructure costs.

In light of these challenges, several critical positive enablers contributed to the success of the Megabus system. First, there was the continued mayoral support in the city of Pereira from three different administrations. Second, the formation of a planning and implementation team outside the local transport and public works departments ensured there was enough capacity to develop system components. Third, the participation of all seven transport companies, and some bus owners, enabled important stakeholders to contribute to the planning process and this led to a successful competitive bidding process. Fourth, the nearby bus manufacturing plant made it easier for the city to purchase buses. And finally, the resettlement policies implemented ensured minimized social disruption and gave fair compensation to all affected groups, including vulnerable populations.

OVERCOMING PUBLIC RESISTANCE TO INCREASED FARES

A balancing act was required for the TransMilenio project that ensured fares were high enough to cover costs without precluding low-income passengers. This was made more difficult due to the city's commitment to implement the project without any subsidies. Partial funding for TransMilenio was generated by passing legislation for a surcharge on gasoline. In 2002 a 25% surcharge (today it is 30%) was added to the fuel price at the gas station with 50% of that going to mass public transit. In addition, the system was designed with the highest efficiencies and system components were redefined in order to meet the financial goal of self-sustainability. On occasion, resources from the system's contingency fund and contributions from the District budget have been used to make up shortfalls. TransMilenio and Megabus have higher fares than the average fare for traditional bus routes (30% and 40% in 2007, respectively), but user-satisfaction is high due to much faster commutes and high quality service.

Cali, Colombia- Masivo Integrado de Occidente (MIO)



MIO Bus (photo from MetroCali official website)

The city of Santiago de Cali, Colombia is currently the third largest city in the country, with a population of 3.5 million. Due to its geographical location it has one of the fastest growing economies and infrastructures in the country.

The Masivo Integrado de Occidente (MIO) project began operation in 2009 and was the third mass transit system to be implemented through the national program. Cali's public transport before MIO was characterized by heavy traffic congestion, high pollution and CO₂ emissions, competitive bus drivers fighting for passengers (the bus fleet had a 42% oversupply which meant 23,156 buses overran the streets) low efficiency and very high accident rates.

The project scope of MIO includes 49 kilometers of trunk roads and 194 kilometers of pre-trunk and complementary roads. Of the total investment of US \$405 million 70% will be financed through national government contributions with the remaining 30% coming from the municipality of Cali. These funds are intended to finance MIO's infrastructure including construction of trunks, fueling stations, rest stops, the system of stations, pedestrian bridges, terminals, and yards. It is expected that larger buses with a capacity of 160 passengers will circulate exclusively on the trunk roads and feeder type buses transporting between 80 and 100 people each will travel through tramways and special diversions.

The initial obstacles in the formative stages of the MIO project included:

- Poor municipal leadership,
- Problems awarding the ticketing contract,
- Opposition from informal transit providers,
- Inadequate local financing, and
- Limited service to periphery parts of the city.

Despite these initial issues, the MIO transportation system successfully began operations in 2009 and has led to major improvements in the city. These include lower particulate matter and CO₂ emissions (Metro Cali estimate indicates that CO₂ emissions have been reduced by 113,428 tonnes in 2010), high ridership (170,000 daily riders) and lower accident rates. It is important to note that while other BRTs in the country are focusing on improving operations (and vehicles and infrastructure) of a corridor or set of corridors, Cali has included the entire public transport system into this project and BRT is one part of it. Thus, it aims at providing a better service for 100% of public transport users. This contrasts to both Bogotá and Pereira that have stand-alone systems and were planned as such.

Peer-to-Peer Learning

An examination of the BRT systems designed and implemented in Colombia, illustrate that there are common barriers to overcome when expanding BRT systems. While each city will experience its own unique set of challenges and each system must be adapted to its respective city, several institutional enablers allowed the national plan to succeed:

Leadership played a major role in the success of Colombia's BRT developments. Political will and leadership was strong in both Bogotá and Pereira and helped build and maintain support for transformational bus service systems. In Bogotá, Mayors Antanas Mockus and Enrique Peñalosa made transportation a key objective of their administrations. (However one must note that the strong political affiliations of BRTs can also impede timely implementation. For instance, Phase 3 of TransMilenio was delayed because mayors didn't want to be seen supporting a project tied so closely to Mayor Peñalosa since they won campaigns based on their opposition to him.) Project champions were also instrumental in providing critical organizational planning and project implementation as was seen with Pereira's Megabus General Manager, Ms. Monica Vanegas. It was instrumental leaders and champions that helped galvanize community support, secure needed funding, and manage potentially derailing opposition. Strong leadership also facilitates

coordination, which is instrumental in negotiations among the various stakeholders and in dealing with other organizational challenges.

Collaboration between the national and local government was crucial to the success of mass transit system development in Colombia, specifically the relationship regarding the 70/30 financing rule. This established a system where the national government helped with planning and orientation plus financing, and the local government responded with interest and commitment to develop the project, along with their share of financing.

A strategic **funding and financing plan** is imperative to overcoming significant infrastructure and operational costs. Colombia's BRT systems demonstrate how a city's existing infrastructure can be leveraged to develop a cost-effective public municipal transportation system. Colombia's national plan requires most capital infrastructure costs, including running ways and stations, to be funded and provided by the public sector. This was usually achieved through a combination of national and local funding and loans from multilateral institutions like the World Bank and Inter-American Development Bank. The private sector provides the vehicles and other equipment (e.g. fare and control systems). Since there are no subsidies, fare revenue must cover all operating and maintenance costs for the contractors. Even though TransMilenio and Megabus have higher fares than independent operators, they attract a high volume of users because public investment and planning enables them to offer efficient and high quality service. Also, by bringing together the public and private sectors into agreed upon contracts, the customer satisfaction motives of the government and the profit motives of private companies can be reconciled. That being said, while the extension of BRT projects to other major Colombian cities was viewed as an ambitious and laudable endeavor, it generated significant cash flow challenges for the national government, since it now funds eight projects instead of one.

Organizational structure is an important component in the successful delivery and operations of a BRT system. Separate planning and implementation organizations were created to work on the BRT systems in Bogotá and Pereira. This allowed sufficient resources to go into such areas as technical design, financial, legal and regulatory services. Additionally, a new organizational management enables some insulation from political and other external influences, and also allows information sharing to be more easily facilitated.

Quality training and educational campaigns help overcome lack of domestic experience in BRT systems and disseminate key information about public transit to the larger public. A key component of Mayor Peñalosa's transportation campaign was education and public awareness of transit and non-motorized travel options. This was a critical step in helping overcome the public's aversion to busways and bikelanes. When a BRT system was finally built in Bogotá, electronic fare systems often required some guidance for new customers to avoid long lines and delays. Outside experts can also offer critical knowledge sharing and best practices of mass

transit systems to designers, contractors, and operators. TransMilenio faces an ongoing effort to craft a positive image among Bogotanos.

Conclusion

Colombia's success in implementing its National Urban Transportation Program (NUTP) offers a compelling model for other countries on to how to overcome critical barriers to designing and implementing transformative transportation systems. This case study also illustrates Colombia's success in leveraging local and international support to **strengthen institutional capacity**, a critical component of NUTP's success. NUTP is heralded as an international best practice of collaboration between the central government and other Colombian cities to address transportation issues in developing countries. In fact, since its inception, delegations from more than 20 countries, including China, India, Vietnam, South Africa, Kenya, Finland and the United States have visited Colombia to learn about the NUTP program.

Colombia is now exploring the potential of a Nationally Appropriate Mitigation Action (NAMA) opportunity that builds upon its strong experience with transportation systems. With more financial support for mitigation-related activities expected to come online in the coming years, transport sector NAMAs offer an opportunity for developing countries to achieve significant reductions in GHG emissions and contribute to sustainable development. CCAP is currently working with Colombia to help develop a Transportation Oriented Development (TOD) NAMA that would establish the conditions for, and supports, private development of mixed use, higher density urban forms within walking distance of mass transit stations. A comprehensive transportation sector NAMA would provide Colombia with additional economic and environmental benefits and would build upon its past transportation policy achievements.

References

1. Darido, G., Cain, A. 2007, Report on South American Bus Rapid Transit Field Visits: Tracking the Evolution of the TranMilenio Model, U.S. Department of Transportation
2. Echeverri, J.C., Ibanez, A.M., and Hillon, J.C. "The Economics of TransMilenio, a Mass Transit System for Bogota," CEDE Document 2004-28, Department of Economics, Universidad de los Andes, August 2004.
3. EMBARQ-Center for Sustainable Transport of the World Resources Institute-WRI. "Ex Post Facto Evaluation Bogota Mass Transit System, Phases I and II", November 27, 2009
4. Energy Sector Management Assistance Program (ESMAP). "Good Practices in City Energy Efficiency: Bogota, Colombia- Bus Rapid Transit for Urban Transport", November 2009. <http://www.esmap.org/esmap/node/660>
5. Hidalgo D., P. Custodio and P. Graftieaux. "A Critical Look at Major Bus Improvements in Latin America and Asia: Synthesis of Lessons Learned." Presentation for the World Bank given in April 2007.
6. Institute for Transportation and Development Policy. "Cali's BRT System Takes Off". April, 2009. <http://www.itdp.org/news/calis-brt-system-takes-off/>
7. Loan proposal by the Inter-American Development Bank "Strategic Public Transportation Systems (SPTS)" found here: <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=36479949>
8. Levinson, H., et al. (2003). "Bus Rapid Transit: Case Studies in Bus Rapid Transit." Transit cooperative Research Program- Report 90. Vol. 1. Transportation Research Board, National Academies, Washington, D.C.
9. Sistemas Integrados de Transporte Masivo 2002/2010. Published by the Colombian Ministry of Transport.
10. Colombian Ministry of Transport (2011). Sistemas Integrados de Transporte Masivo 2002/2010.
11. Official page of TransMilenio S.A. and the TransMilenio System www.transmilenio.gov.co
12. Official page of Megabus S.A. www.megabus.gov.co
13. Official page of MetroCali S.A. www.metrocali.gov.co