Lima’s bus rapid transit (BRT) system seeks to improve mobility and access to education, jobs and other opportunities for its low-income residents, mainly on the outskirts of the city.

The Metropolitan (El Metropolitano in Spanish), the Lima metropolitan region’s BRT system, consists of dedicated bus lanes along the main road corridor connecting northern Lima with southern Lima, and feeder routes linking low-income neighbourhoods on the outskirts of the city with the main bus terminals. The project seeks to enhance the quality of life and economic productivity of low-income residents through the provision of an affordable, efficient, reliable, cleaner and safer public transport system.

The Metropolitan has been operating since 2010. It turned from the traditional, disorganised, unreliable bus service into the backbone of a more efficient and affordable public transport network. The project has connected lower income neighbourhoods to employment areas, education, healthcare and facilities in the city centre.

The Metropolitan transports about 700,000 passengers per day¹ and has provided multiple benefits to the Lima metropolitan region. The most significant benefit is shorter travel times (a 25% and 45% saving when travelling to/from the north/south²) and a reduction of about 400,000 tons of CO₂ emissions due to the use of natural gas to power the fleet³.

The key Action Area identified is Project Planning, Development and Delivery. The BRT system in Lima has established inclusive planning and design in transport infrastructure to connect low-income neighbourhoods on the edge of the city with employment opportunities in the city centre and has facilitated access for people with disabilities. The Action Area Stakeholder Identification, Engagement and Empowerment is also covered in this case study, as widespread and varied stakeholder engagement was conducted for this project, particularly throughout the design process.

¹ About Us Metropolitan (Instituto Metropolitano PROTRANSPORTE de Lima, 2018a)
³ More than 400,000 tons of CO₂ reduction from the Metropolitan in 2017 (Metropolitano, 2017)
**Project Overview**

**Key words**
- Low-income neighbourhoods, accessibility, mobility, stakeholder engagement

**Sector**
- Transportation

**Background**
Lima is one of the fastest growing cities in Latin America. Many of its lower income neighbourhoods are on the outskirts of the city and have poor public transport networks. Chaotic and informal services, as well as high levels of congestion, pollution and accidents, lead to long journey times, which makes it difficult for people, particularly in low-income groups, to access job opportunities, education and services. Therefore, the Lima metropolitan region identified the need to develop a more affordable, efficient and reliable public transport system.

**Size**
Project approved (in 2003) for USD 134.43 million, with:
- USD 45 million from The World Bank (International Bank for Reconstruction and Development (IBRD));
- USD 7.35 million from the Global Environmental Facility; and
- USD 45 million from the Inter-American Development Bank (IADB)

*1
Final cost (in 2009) was USD 261.9 million. The difference was entirely financed by the borrower, the Metropolitan Municipality of Lima, with a loan guarantee from the Government of Peru.

**Stage**
The project commenced in 2003. The BRT system has been operating since 2010.

**Why of interest**
- Reducing the geographic divide to improve accessibility to jobs and services for low-income residents
- Focus on low-income communities
- Saving travel time by establishing efficient, reliable, safer and affordable public transport systems

**Project objectives**
- Improve public transport and mobility conditions for the population of metropolitan Lima, particularly among low-income groups
- Reduce traffic congestion
- Reduce air pollution and carbon emissions
- Reduce traffic accidents

**Project Lifecycle Assessment**

**Project preparation** — Integration of main trunk and feeder routes to reach low-income neighbourhoods located on the outskirts of the city.

**Project procurement** — No relevant practices identified.

**Construction** — Pedestrian stairs "Stairs of Solidarity" to improve pedestrian mobility in informal settlements and to more easily reach feeder routes.

**Project monitoring and evaluation** — Web-based database for monitoring and evaluating data managed by a third party. IADB Office of Evaluation and Oversight (OVE) facilitated the evaluation of project success and recommendations.

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Project Description

Lima is one of the fastest growing cities in Latin America. The population grew by 11% between 2007 and 2012 and reached a recorded population of about 10 million in 2017. About 42% of people in Lima are classified as extreme poor (stratum E) and 19% are classified as poor (stratum D), and they live on the outskirts of Lima mainly in the northern and southern areas of the city, while higher income residents are located in the centre and south-central areas. About 54% of working age adults are informally employed, which can lead to an unstable market, lower pay and negative consequences for productivity, inequality, growth and trade.

Prior to the introduction of the Metropolitano bus rapid transit (BRT) system, public transport in Lima was chaotic with an oversupply of aging buses, low quality infrastructure, high levels of informality, and poor quality services, which led to traffic congestion, accidents and air pollution. There were many bus routes run by mini-vans (Combis) that connected key locations across the city, however journey times were very long, and service was unreliable.

In the 1970s, Lima pioneered a prototype of the modern BRT system in Latin America and the concept of segregated lanes was first introduced in the city along the Express Highway (Vía Expresa). The system continued until the early 1990s, when the operating company went bankrupt.

The fast-growing population and high motorisation rates have contributed to an increase in travel demand in the city. This has been exacerbated by urban sprawl and the development of informal settlements on the outskirts of Lima. For residents living in these areas, it takes a long time to get to the city centre.

Drawing on the successful experience of other Latin American cities, Lima developed the Metropolitano BRT system of the Lima metropolitan region in 2003, and it has been operating since 2010. The project was developed with funding from the International Bank for Reconstruction and Development (IBRD), the Inter-American Development Bank (IADB) and the Global Environmental Facility.

According to the loan agreement with the IBRD and IADB, the project sought to “enhance the economic productivity and quality of life by improving mobility and accessibility for the population, especially in the peri-urban poor neighbourhoods, through establishing an efficient, reliable, cleaner and safer BRT system operating on segregated bus lanes.”

The Metropolitano project consists of about 27 kilometres (km) of dedicated bus lanes running from the north of the city to the south of the city, known as the main trunk routes (trunkal in Spanish). There are 35 bus stops on raised platforms, two main terminals at both ends of the main trunk, approximately 30 km of feeder roads linking neighbourhoods on the edge of the city with the main terminals, cycleways, environmental enhancements and pedestrian bridges.

The number of passengers has doubled since the service started in 2010. Approximately 500 buses, running on compressed natural gas (CNG), transport around 700,000 people per day. The system is operated by four private bus companies with a concession of USD 174 million for 12 years. It is estimated that CO₂ emissions have been reduced by 400,000 tons, due to the buses running on natural gas.

One of the main cited benefits of the Metropolitano is the significant reduction of travel times. According to the Lima Metropolitan Institute Protransporte (Protransporte), the average travel time from origin to destination for users decreased from 50 minutes to 38 minutes in 2013, while travel time through the corridor from Naranjal (north terminal) to Matellini (south terminal) along the main trunk has fallen from 120 minutes to about 65 minutes. This equates to an overall reduction in travel time of 25% and 45% when travelling to/from the north/south on the BRT.

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4 10 million people live in the metropolitan Lima (National Institute of Statistics and Information, 2016)
5 Based on poverty data from the National Institute of Statistics and Information. A Stratum is a category of income level.
6 Presentation BRT Systems and Social Inclusion (Scholl, et al., 2018)
7 Combis are shared mini-vans that informally transport passengers.
8 The Lima metropolitan region is comprised of the Metropolitan Municipality of Lima and the Constitutional Province of El Callao.
Key Practices Identified and Applied

PROJECT PLANNING, DEVELOPMENT AND DELIVERY

Statement of the issue in relation to inclusion and brief introduction

People on lower incomes are often the worst affected by poor public transport services and experience longer travel times, higher exposure to pollution and increased risk of traffic accidents. This is often because they are living on the edge of cities where there is no affordable and efficient network. That creates social exclusion and impedes access to employment opportunities, services and market.

In Lima, about 40% of the extreme poor (stratum E) and 20% of the poor (stratum D) live on the outskirts of the city. The extreme poor often live in informal settlements that lack good public services and infrastructure, e.g. narrow, unpaved roads. This spatial segregation of people from job locations decreases affordability to search and access jobs, thereby increasing unemployment. Travel patterns of people on lower incomes differ in terms of mode and expenditure. They have longer travel times, and greater usage of public transport and non-motorised transport modes due to affordability barriers. About 28% of daily trips by the poor and 35% by the extreme poor in Lima are undertaken on foot, followed by traditional buses, such as Combís.\textsuperscript{15}

The Metropolitano was conceived to improve services and to connect low-income neighbourhoods on the edge of the city with employment areas in the city centre. Prior to the BRT, people could cross the city using one form of transport (Combi) but travel times were excessive.

Three years ago, the Metropolitan Institute of Transport for Lima (Instituto Metropolitano Protransporte de Lima, or Protransporte, the agency that implemented the project) estimated that about 80% of Metropolitano users come from low-income groups settled on the outskirts of the city.\textsuperscript{16} A more recent survey by the Office of Evaluation and Oversight (OVE) of the IADB stated that whilst the system has attained its goal of having 60% of its riders from socioeconomic strata C (lower middle income), D and E, the share of ridership by the poor and extreme poor (strata D and E) is about 43% (which is lower than the lower middle income strata at 57%). The reason for this is that the BRT does not reach the areas where the extreme poor live and work.

How inclusivity has been addressed

The identified practice is establishing inclusive planning and design to improve accessibility and mobility for low-income groups.

The project aligns with Lima’s strategic objectives of becoming a safer, modern and competitive city. It was also consistent with the World Bank’s Country Assistance Strategy for the financial years 2002-2006 and Country Partnership Strategy for the financial years 2007-2011. They aimed to encourage sustainable economic growth and reduce poverty by enhancing public transport, creating a direct impact on the productive lives of the poor, reducing air pollution and cutting the transport infrastructure deficit.\textsuperscript{17}

The Metropolitano was conceived to improve public transport, to reduce congestion, pollution and traffic accidents, and to connect low-income neighbourhoods on the edge of the city with employment areas in the city centre.

This was achieved by reconfiguring the traditional and unreliable service to make it a more efficient trunk and feeder network that could be reached by a wider population. The main trunk system connects the low-income neighbourhoods in the north and south of Lima.

The feeder routes were specifically included in the design to reach the low-income neighbourhoods. They were determined by areas of high population and low income. The feeder routes run through neighbourhoods on the outskirts of the city and connect with the north and south terminals located at both ends of the main trunk. New buses replaced the older vehicles in the feeder routes. They help the entire system to be more efficient, more reliable and safe. There are 17 feeder routes which served 55,947,865 users per year in the north area in 2016 and four feeder routes which served 12,208,452 users per year in the south.\textsuperscript{18}

\textsuperscript{15} An Evaluation of the Effects of IDB Supported BRT Systems on Mobility (Office of Evaluation and Oversight, 2016a)


\textsuperscript{18} VII Report of Results on Quality of Life in Lima and Callao. (Lima Como Vamos, 2016).
Implementation

The planning and design of the BRT considered several criteria such as capacity, passenger demand, speed and cost of execution, and reaching low-income neighbourhoods. The location of the main trunk road used existing infrastructure such as the express highway (Vía Expresa). The highway connects areas with high demand for public transit.

Feeder routes in low-income areas

The feeders were identified as essential to reach the low-income areas. Although a demand study was not undertaken, the location for feeder routes was identified in relation to known areas of low-income and high population to the north and south of the city. Figure 2 shows the Metropolitano routes in relation to socioeconomic strata, and highlights that the integrated trunk-feeder network extends to some of the city’s lower income neighbourhoods.

In recognition of the need to continually improve access for people on lower incomes, Protransporte has identified complementary corridors to the east and west of the city, which will improve access for a wider community. This is part of an Integrated Transport System network comprised of the trunk route, feeder routes and metro lines, with works proposed for 2018.

Stairs of Solidarity

An additional project was also introduced to improve access to the system from low-income neighbourhoods. The Stairs of Solidarity (Escaleras de la Solidaridad) were developed by the Metropolitan Municipality of Lima to improve access to the BRT feeder system for people living in the informal settlements located in the steep hills on the edge of the city. Before this project, residents in these informal settlements had to walk through mud roads on steep hills to reach feeder routes. The roads were unsafe and difficult for women, the elderly and children, and were particularly inaccessible for people with disabilities.

The municipality built stairs for communities and provided them with better access to the feeder routes. With the provision of infrastructure, the quality of life in these vulnerable communities improved. Residents were able to reach the feeder routes of the Metropolitano system and to access services, schools and jobs in a much safer way.

The Stairs of Solidarity have been implemented in different locations and have become one of the flagship programs of the current administration. It demonstrates the local government’s commitment to setting up programs that help overcome barriers and positively impact a wider community.
Universal Design
To provide access for all, the original design of the BRT included Universal Design principles, supported by the World Bank. The BRT’s Universal Design enables access for people with disabilities. The stations include exclusive-use lifts, ramps, dedicated spaces within the bus for people with wheelchairs, and red seats for the exclusive use of pregnant women, the elderly and children.

Supervision and monitoring
No specific monitoring of inclusivity targets is currently undertaken by Protransporte.

Performance evaluation and surveys
‘Lima, how are we doing?’ (¿ Lima Como Vamos ?) is a monitoring and evaluation tool used to analyse changes in people’s quality of life. Performance evaluation reports and satisfactory survey reports are released annually. They summarise progress and reference public policies related to environment, mobility, culture, education, public spaces and health for the Lima metropolitan region. The reports include mobility indicators, such as the total number of users of the Metropolitano, transport mode share, origin and destination, number of cards issued and accidents. There are no specific indicators on inclusivity.

The tool aims to investigate urban issues affecting people’s quality of life and collect data to inform decision-making, to guide prioritisation and to provide information of interest to all citizens. This is also a tool that measures the views and perceptions of public projects and activities to encourage more people to get involved in the city’s development projects.

Multilateral Development Bank assessments
The BRT system was subject to a project performance assessment by the Independent Evaluation Group (IEG) of the World Bank in 2015, and an evaluation by the IADB’s Office of Evaluation and Oversight (OVE), as part of an evaluation of three BRT systems across Latin America (also including Cali in Colombia and Montevideo in Uruguay) in 2013 and 2016.

The OVE identified the following:

- The Metropolitano has succeeded in achieving its goal of having 60% of its riders from middle- and lower-income communities (socioeconomic strata C, D and E);
- People from lower income areas have highly positive perceptions of the system speed;
- The system is generally perceived as affordable; however, the extreme poor still find the fare unaffordable; and
- Affordability is a barrier for the poor in using the BRT system for a large share of their trips. Given the integrated and flat fare pricing structure, the poor tend to use the BRT for longer trips because the price then becomes competitive with the traditional transit services.

Some of these findings are relevant in terms of maximising the benefits of inclusivity for BRT systems:

- BRT systems should consider implementing inclusive fare policies. To improve affordability for the poor, targeted vouchers could be used, or preferential tariffs could be added.
- A diagnosis of the mobility needs of the poor should be conducted to achieve inclusivity objectives, including analyses of issues around access, spatial mismatches between skill-appropriate jobs and housing, travel patterns and affordability. In general, income can be an unreliable measure of poverty, so it is better to use social strata data such as quality of housing, ownership of vehicles, etc.
- Inclusion of the extreme poor may need to consider feeders to those areas of low-density population.
- Given the complex urban settings in which BRTs are typically located, an integrated multimodal transport and land use planning approach involving inter-agency coordination is required. This should prioritise investments in physical infrastructure and system design adopting a comprehensive view, based on multiple stakeholder inputs and sound technological, policy and financial analysis. Reforms in support of the system, such as government-supported land use policies, are also required.
How inclusivity has been addressed

The identified practice is extensive stakeholder engagement with the affected communities, particularly during the design process, leading to community support and resolution of conflict.

Benefits Realisation

<table>
<thead>
<tr>
<th>Identified benefit</th>
<th>Benefit description</th>
</tr>
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<tbody>
<tr>
<td>Increase affordability and accessibility</td>
<td>Improved accessibility to jobs and schools – usage of the Metropolitano is mainly to attend work (60%) and high school/college (20%). 60% of its passengers are from middle- and lower-income areas (socioeconomic strata C, D and E).</td>
</tr>
</tbody>
</table>

| Job creation and equal access to labour market opportunity | Saving travel time – for lower income people this could mean extra time to carry out additional work. Overall journey time has been reduced from 50 minutes to 38 minutes. |

| Reducing geographic divide | Improved access to the city centre from lower income neighbourhoods in the north and south of Lima. Improved access to the feeder system for communities located in the hills on the city’s outskirts. |

| Increasing gender equity | Awareness campaigns encourage women who feel harassed to come forward to security staff, with the aim to increase safety and reduce incidents of harassment. |

Implementation

Community consultation

The Municipality of Lima’s engagement with communities during the design phase was focused on the main trunk road, as the works associated with feeder routes were minor (small improvements to existing roads) and therefore not considered likely to generate resistance. In particular, priority was given to the community surrounding the northern terminal workshop. The proposal was to locate the facility in a low-income neighbourhood, adjacent to a park.

Discussions were held with small groups of people who could have been indirectly affected by the development (for example, by increasing the distance they would need to travel to reach a road crossing). Door-to-door surveys were also conducted in the affected neighbourhoods. A draft map of the project was presented and potential conflicts were identified and discussed. People’s feedback and recommendations were considered as part of the design process. Examples of ideas that were incorporated in the design include the construction of a pedestrian boulevard and an outside gym in the park. It was stated that the level of consultation led to community support for the works and resolved conflicts with local stakeholders.

Awareness campaigns

Stakeholder engagement is not limited to the development stage. Protransporte still undertakes awareness and education campaigns targeted at passengers and the general public to strengthen its values and culture, particularly in relation to pedestrians and drivers. It also encourages people to respect other users and to report any incidents that occur on the system. The campaigns encourage people, particularly women who feel verbally or physically harassed, to report to the staff or security guards. Victims can receive legal, psychological and social counselling. Protransporte reports that the campaign has resulted in a 90% reduction of incidents of this nature.

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19 Metropolitano About Us. (Lima Metropolitan Institute of PRO-TRANSPORT, 2018b).

*2 An Evaluation of the Effects of IDB Supported BRT Systems on Mobility (Office of Evaluation and Oversight, 2016a)

## Stakeholders

<table>
<thead>
<tr>
<th>Key beneficiaries</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-income communities</td>
<td>Low-income residents living on the outskirts of the city benefit from the BRT system to access employment and education opportunities.</td>
</tr>
<tr>
<td>People with disabilities</td>
<td>Stations and buses are now easily accessed by people with disabilities.</td>
</tr>
<tr>
<td>BRT system users</td>
<td>Saving travel time has allowed BRT users to spend additional time on other activities.</td>
</tr>
<tr>
<td>Women</td>
<td>Reduced incidents of assault have increased accessibility of the BRT system for women.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Institutional stakeholders and partners</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipalidad Metropolitana de Lima (MML)</td>
<td>The Metropolitan Municipality of Lima (MML) has the strategic vision for Lima to become a safer, modern, competitive, sustainable and integrated city. MML identified that the chaotic and informal public transport system was one of the main barriers to achieving its vision and therefore implemented a bus rapid transit system to enable people to have a better quality of life.</td>
</tr>
<tr>
<td>Lima Metropolitan Institute for Transport (Instituto Metropolitano de Transporte de Lima – Protransporte)</td>
<td>Protransporte was set up in 2002 by Municipal Decree No. 035 as the executing agency to be responsible for the BRT system. This financial and administrative autonomous agency provides effective, efficient and sustainable transport solutions for the Lima metropolitan region.</td>
</tr>
<tr>
<td>Empresa Municipal Administradora de Peaje (EMAPE)</td>
<td>EMAPE is a public institution under the MML responsible for roads infrastructure and toll management. It supported the construction of the BRT infrastructure financed by the municipality after the original cost was increased.</td>
</tr>
<tr>
<td>Urban Transport Management (Gerencia de Transporte Urbano)</td>
<td>Public organisation under MML for the operation of the integrated transport system in the metropolitan area.</td>
</tr>
</tbody>
</table>
Lessons Learned

Success factors

Inclusion of feeder routes to reach low-income neighbourhoods. Improving mobility and accessibility for lower income residents through the BRT system requires integrating the main routes with feeder services and with other public transport systems that reach low-income neighbourhoods. While the Metropolitano was able to do this for a significant number of people, it has recognised the need for further feeder routes and initiatives to include more vulnerable residents.

Improved travel times and accessibility. Increasing the potential for people to get to work more quickly, or allowing, for example, small business owners to reach more customers during the day.

Inclusion of Universal Design principles. BRT international guidelines and best practices have been followed by Protransporte as the executing agency, and Lima Metropolitan Municipality, to embed Universal Design principles and integrate planning for vulnerable groups, such as people with disabilities.

Ongoing anti-harassment awareness campaigns have led to a reduction of 90% in verbal or physical harassment incidents within the BRT system.

Key challenges

Political support for the project and managerial support. Although this is an infrastructure project, political commitment is essential to identifying the project as a priority and successfully delivering it. Rapid turnover of members of the senior management team and lack of retention of technical professionals have caused delays on the project, especially at the beginning, and can affect the continuity of operational procedures. Additionally, the project became the centre of political debate and dispute, which led to delays in extension of the system.

Trade-off between affordability and profitability. Affordability for all needs to be balanced against the profitability of the project. The challenge is to achieve affordability in lower income areas where demand is low.

 Preferential tariffs for lower income users and other vulnerable people. The current fare for the Metropolitano trunk routes is USD 0.75 (2.5 soles) in trunk routes and USD 0.15 (0.5 soles) for feeder routes that count towards the maximum integrated trip fare of USD 0.75 (2.5 soles). A preferential fare is only available by law for school and university students, who get a 50% discount. An integrated fare of USD 0.75 (2.5 soles) is considered very positive, but the extreme poor still find the fare inaccessible. The affordability of a fixed rate tariff structure is likely to have a greater effect on accessibility for the poor.
References


Interviews
