



**Project Performance Assessment Report**

**Republic of Peru**

**LIMA TRANSPORT PROJECT**

**(IBRD-72090 TF-52877 TF-52856)**

**December 17, 2015**



## Currency Equivalents (annual averages, selected years)

*Currency Unit = Peruvian Nuevo Sol (PEN)*

2003	US\$1.00	PEN 3.48
2005	US\$1.00	PEN 3.29
2010	US\$1.00	PEN 2.83
2011	US\$1.00	PEN 2.75
2012	US\$1.00	PEN 2.64
2013	US\$1.00	PEN 2.70
2014	US\$1.00	PEN 2.84

## Abbreviations and Acronyms

BRT	Bus Rapid Transit
CAS	Country Assistance Strategy
CPS	Country Partnership Strategy
FONAM	Fondo Nacional del Ambiente (National Environmental Fund)
GEF	Global Environment Facility
GTNM	Gerencia de Transporte no Motorizado (Non-Motorized Transport Bureau)
GTU	Gerencia de Transporte Urbano (Urban Transport Bureau)
IBRD	International Bank for Reconstruction and Development
ICR	Implementation Completion and Results Report
IDB	Inter-American Development Bank
IEG	Independent Evaluation Group
JICA	Japan International Cooperation Agency
LMR	Lima Metropolitan Region
MML	Metropolitan Municipality of Lima
MTC	Ministry of Transport and Communication
PAD	Project Appraisal Document

## Fiscal Year

Government: January 1 – December 31

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This report was prepared by Ryotaro Hayashi, who visited Peru during June-July 2015 along with Ramachandra Jammi. The report was peer reviewed by Fang Xu and panel reviewed by Robert Lacey. Richard Kraus provided administrative support.

## Principal Ratings

### LIMA TRANSPORT PROJECT (LOAN 72090 TF-52877 TF-52856)

	ICR*	ICR Review*	PPAR
Outcome	Satisfactory	Moderately Satisfactory	Satisfactory
Risk to Development Outcome	Negligible to Low	Moderate	Significant
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	Moderately Satisfactory
Borrower Performance	Moderately Satisfactory	Moderately Satisfactory	Moderately Satisfactory

\* The Implementation Completion and Results (ICR) report is a self-evaluation by the responsible Bank department. The ICR Review is an intermediate IEG product that seeks to independently verify the findings of the ICR.

## Key Staff Responsible

### LIMA TRANSPORT PROJECT

Project	Task Manager/	Division Chief/ Sector Director	Country Director
Appraisal	Paul A. Guitnik	Jose Luis Irigoyen	Marcelo Giugale
Completion	Arturo Ardila	Aurelio Menendez	Susan G. Goldmark

### LIMA TRANSPORT PROJECT (GEF)

Project	Task Manager/	Division Chief/ Sector Director	Country Director
Appraisal	Pierre Graftieaux	Jose Luis Irigoyen	Marcelo Giugale
Completion	Elisabeth Goller	Aurelio Menendez	Susan G. Goldmark

**IEG Mission: Improving World Bank Group development results through excellence in independent evaluation.**

**About this Report**

The Independent Evaluation Group assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, IEG annually assesses 20-25 percent of the Bank's lending operations through field work. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming studies or country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons.

To prepare a Project Performance Assessment Report (PPAR), IEG staff examine project files and other documents, visit the borrowing country to discuss the operation with the government, and other in-country stakeholders, and interview Bank staff and other donor agency staff both at headquarters and in local offices as appropriate.

Each PPAR is subject to internal IEG peer review, Panel review, and management approval. Once cleared internally, the PPAR is commented on by the responsible Bank department. The PPAR is also sent to the borrower for review. IEG incorporates both Bank and borrower comments as appropriate, and the borrowers' comments are attached to the document that is sent to the Bank's Board of Executive Directors. After an assessment report has been sent to the Board, it is disclosed to the public.

**About the IEG Rating System for Public Sector Evaluations**

IEG's use of multiple evaluation methods offers both rigor and a necessary level of flexibility to adapt to lending instrument, project design, or sectoral approach. IEG evaluators all apply the same basic method to arrive at their project ratings. Following is the definition and rating scale used for each evaluation criterion (additional information is available on the IEG website: <http://ieg.worldbankgroup.org>).

**Outcome:** The extent to which the operation's major relevant objectives were achieved, or are expected to be achieved, efficiently. The rating has three dimensions: relevance, efficacy, and efficiency. *Relevance* includes relevance of objectives and relevance of design. Relevance of objectives is the extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). Relevance of design is the extent to which the project's design is consistent with the stated objectives. *Efficacy* is the extent to which the project's objectives were achieved, or are expected to be achieved, taking into account their relative importance. *Efficiency* is the extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. The efficiency dimension generally is not applied to adjustment operations. *Possible ratings for Outcome:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

**Risk to Development Outcome:** The risk, at the time of evaluation, that development outcomes (or expected outcomes) will not be maintained (or realized). *Possible ratings for Risk to Development Outcome:* High, Significant, Moderate, Negligible to Low, Not Evaluable.

**Bank Performance:** The extent to which services provided by the Bank ensured quality at entry of the operation and supported effective implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of supported activities after loan/credit closing, toward the achievement of development outcomes. The rating has two dimensions: quality at entry and quality of supervision. *Possible ratings for Bank Performance:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

**Borrower Performance:** The extent to which the borrower (including the government and implementing agency or agencies) ensured quality of preparation and implementation, and complied with covenants and agreements, toward the achievement of development outcomes. The rating has two dimensions: government performance and implementing agency(ies) performance. *Possible ratings for Borrower Performance:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.



## Preface

This Project Performance Assessment Report (PPAR), prepared by the Independent Evaluation Group (IEG), evaluates the Lima Transport Project (2003-2011) in Peru.

The project was approved on December 9, 2003 with an IBRD Loan (IBRD-72090) and GEF Grant (TF-52856, TF-52877) of US\$45 million and US\$7.93 million respectively. At completion, all of the IBRD loan and 93 percent of the GEF grant (US\$7.35 million) was disbursed. The final project cost was US\$261.9 million, about 95 percent higher than appraisal (US\$134.43 million). The difference (US\$171.90 million) was entirely financed by the Borrower, a substantial increase over US\$44.40 million at design.

The project closed on April 30, 2011, twenty two months after the planned completion date of June 30, 2009 (the delay for the GEF-funded portion was somewhat lower at twelve months, closing on June 30, 2010). The IBRD-funded portion was restructured three times to account for delays in satisfying the loan effectiveness conditions; and harmonization of procurement procedures with the co-financing institution, Inter-American Development Bank (IDB). The GEF portion was restructured once in order to modify some activities and add others.

The project supported the goal of the Metropolitan Municipality of Lima (MML) to enhance the economic productivity and the quality of life within the Lima Metropolitan Region (LMR) through improving mobility and accessibility for the metropolitan population, especially in the peri-urban poor neighborhoods by establishing an efficient, reliable, cleaner and safer Bus Rapid Transit (BRT) system operating on segregated busways. The project also sought to facilitate greenhouse gas reduction from ground transport in LMR through promoting a long-term modal shift to non-motorized transport.

IEG selected this project for assessment because of potential lessons from the experience of the BRT system in Lima (also known as “Metropolitano”) with environment-friendly and pro-poor design features. The findings and lessons from this assessment will be an important input to IEG’s forthcoming major evaluation; Sustainable Urban Transport Service Delivery for the Poor.

This report draws upon documentation for relevant Bank-funded projects such as Project Appraisal Documents, Implementation Completion and Results Reports, legal agreements, project files and archives. The report also benefited from case studies prepared by the Office of Evaluation and Oversight (OVE) at IDB, which co-financed this project. Japan International Cooperation Agency (JICA) produced the Lima Urban Transport Master Plan, which provided rich data for this evaluation, although JICA was not involved in financing this project. An IEG field mission visited Peru during June 20-30, 2015. Discussions were held with Bank staff in Washington, DC and in Lima, and government and other officials in Lima. Interviews and discussions were also held with a cross-section of Metropolitano users including disabled people. The IEG mission members gained first-hand experience of the Metropolitano BRT by traveling on several segments of the trunk routes and feeder services at peak and non-peak hours.

The mission expresses its appreciation of the generous time and attention given by the Borrower and all concerned parties. A list of persons met by the mission is in Annex D.

Following IEG practice, copies of the draft report were sent to government officials and implementing agencies, and comments from the Ministry of Transports and Communications were received and reflected in this report.

## Summary

This Project Performance Assessment Report (PPAR) assesses the development effectiveness of the Lima Transport Project in Peru. The project’s objective was “to enhance the economic productivity and the quality of life within the Lima Metropolitan Region (LMR) through improving mobility and accessibility for the metropolitan population, especially in the peri-urban poor neighborhoods by establishing an efficient, reliable, cleaner and safer mass rapid transit system.” The GEF Grant Agreement (TF052856) states the objective identically to the Loan Agreement, and adds the promotion of non-motorized transportation: “enhancing the economic productivity and the quality of life in the Lima-Callao metropolitan area by improving mobility and accessibility for its population through the establishment of an efficient, reliable, cleaner and safer mass transit system and by promoting non-motorized transportation.”

### Project performance and ratings

The Project aimed to improve the urban transport system through a public private partnership in the context of a briskly-growing economy and rapid urbanization. Lima was the first city in Latin America to pioneer a Bus Rapid Transit (BRT) system in the early 1970s, and this experience was fed into the first modern BRT system in Curitiba (Brazil). After *Transmilenio* in Bogota (Colombia) became a showcase to spread the BRT system, a modern BRT system in Lima known as *Metropolitano* was developed under the project.

The overall project development outcome is rated **Satisfactory**. Relevance of the project development objective is rated **substantial** because of its alignment with both the country and Bank’s strategies and priorities. Relevance of the project’s design is rated **modest**. The project had logical linkage between inputs, outputs, intermediate outcomes, and outcomes, but several indicators and key objectives could have been more clearly and realistically formulated. Efficacy of the first sub-objective “the establishment of an efficient, reliable, cleaner and safer mass transit system” is rated **substantial** due to tangible achievements in providing such urban transport services through the BRT system. The second sub-objective, comprising “improving mobility” and “accessibility for its population, especially in the peri-urban poor neighborhoods”, is also rated **substantial** because of increasing traffic volume and usage for commuting to the workplace and higher education. Although the benefit for the poor might be less than for the non-poor, and the very poor appear to have benefited hardly at all, the project improved connections between the poor residential areas in the northern and southern parts of LMR. The overarching objective of “enhancing the economic productivity and the quality of life in the Borrower’s municipal territory” has difficulties in measurement and attribution, but substantial achievements for the other two sub-objectives are likely to have contributed favorably to the overarching objective. Efficiency is rated **substantial** taking into consideration cost-effectiveness in comparison to similar projects across different countries, through there were operational and administrative inefficiencies, reflected in large cost and time overruns. Bank and Borrower Performance were both rated **Moderately Satisfactory**.

## Lessons

**Improving mobility and accessibility for the poor through Bus Rapid Transit systems requires integrating the main corridor effectively with feeder services and other public transport system that reach close to the traveler's origins and destinations.** While the Metropolitano BRT was able to provide mobility to a significant number of poor residents, it is not likely to reach its potential for serving this population segment without extensive penetration of feeder routes with multiple modes, to their work, school, hospital and residential locations.

**Realistic scenarios and sound risk allocation are crucial for public-private partnerships if high service standards are to be maintained.** In this project, the private bus operator concessions did not include a minimum revenue guarantee from the Metropolitan Municipality of Lima (MML). The number of passengers was below the target at project completion even after five years of operation, and the situation was particularly serious in the initial operating stage. To close the gap between the planned and actual scenarios, analysis for competition with other transport modes, enforcement of a sound regulatory framework and communication to citizens needed to be strengthened.

**Given the complex urban settings in which rapid urban transport systems are typically situated, it is important to inform and consult with all categories of project affected persons, to anticipate and take effective measures to prevent possible negative environmental and social impacts and related disputes.** In this project, insufficient information was provided to residents of a locality that was eventually impacted by re-routing of traffic from the project, resulting in a complaint and an Inspection Panel investigation, which contributed to delays in project implementation.

**A shift towards non-motorized transport can be expected to take a long time even with enabling and supporting factors and facilities in place.** The experience with promoting bicycle usage in the Lima Metropolitan Region demonstrates the slow pace at which non-motorized transport is adopted. The bikeway infrastructure development and awareness raising campaigns could be necessary conditions, but they are not sufficient. In this case, this transformation was delayed further by insufficient attention to other supporting factors, such as safe parking space and raising drivers' awareness of the need to share the road with bicycles. More broadly, the prevailing cultural attitudes toward using bicycle should be taken into account.

Caroline Heider  
Director-General  
Evaluation

## 1. Background and Context

1.1 Peru has seen a period of broad-based and rapid economic growth in recent years, with an annual GDP growth rate of 6.0 percent in 2012 and 5.8 percent in 2013. The national poverty rate has halved between 2005 and 2013. Income inequality measured by the Gini Coefficient has also improved, and Peru has made progress in terms of shared prosperity.

1.2 Lima Metropolitan Region (LMR) – comprising the adjacent jurisdictions of the Metropolitan Municipality of Lima (MML) and the Constitutional Province of Callao – has been a key driver of these transformational changes. Approximately one third of Peru’s population lives in LMR, and this region generates half of the GDP in the country (INEI 2013). LMR has made some progress in respect of shared prosperity in the 2004-2012 period as seen in the higher mean income growth of the bottom 40 percent (5.4 percent) as compared to overall income growth (4.0 percent). According to INEI (2013), the number of people below the poverty line<sup>1</sup> in the LMR decreased from 25.1 percent in 2007 to 14.5 percent in 2012, and extreme poverty was less than one percent in the LMR.

1.3 However, LMR still contains large concentrations of low-income groups and significant socio-economic disparities. In the LMR, there are 1.3 million people considered poor and an additional 1.7 million are considered vulnerable<sup>2</sup> (World Bank 2015). Continued migration into LMR poses new urban development challenges, with the population expected to increase by around 1.6 percent per year in the near future. Rapid urbanization, spatial development patterns and inadequate transport services hamper LMR’s productivity, and constrain the poor’s access to employment opportunities, basic needs, and social services; as well as making it difficult to improve the environment.

### Urban Transport in Lima Metropolitan Region

1.4 Urban transport issues came to the fore in LMR in the years following Peru’s economic liberalization policies in the 1990s. Inter alia, these policies enabled the massive import of motorized vehicles in Peru. Together with the deregulation of public transport, this contributed to a rapid increase in informal taxis, minibuses, and moto-taxis. While the expanded availability and accessibility of vehicles provided opportunities for poor people in peri-urban areas to use transportation services, the consequences of unregulated policy were high congestion, increased traffic accidents, operation cost, noise and air pollution. World Bank studies in the early 2000s estimated that about US\$500

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<sup>1</sup> The extreme poverty line in LMR was 139 soles (2007) and 182 soles (2012). Similarly, the poverty line was 309 soles (2007), 361 soles (2012). The monetary poverty line was determined based on the basic consumption needs from the viewpoint of food component and non-food component.

<sup>2</sup> People who are just above the subsistence level and just 23-40 percent of average household income in LMR are considered as vulnerable. They earn monthly income between 330 soles and 550 soles.

million was lost every year in man-hours and operational costs due to congestion and inefficiencies of LMR's urban transport system.

1.5 The Bank's Lima Transport Project, which is assessed in this report, responded to these needs by supporting a modern Bus Rapid Transit (BRT) system, also known as *Metropolitano*. *Metropolitano* BRT is a 26.78 kilometers exclusive busway in a north-south alignment and operating approximately 500 natural-gas fueled buses with an extensive feeder bus network. Since its opening in 2010 and as a result of its higher level-of-service compared to conventional modes, *Metropolitano* ridership has grown steadily. However, while the average number of passenger per weekday is still below the target value, the demand for *Metropolitano*'s services exceeds its capacity in peak hours and has prompted the Metropolitan Municipality of Lima (MML) to extend the BRT corridors toward northern directions. Also, to meet the growing demand for rapid urban transport, *Tren Eléctrico* (as known as Line 1 of the Metro system), a 34 kilometers elevated rail transit line funded by the central government on a different north-south alignment from the BRT, started limited operations in 2010. The ridership on Metro Line 1 is also growing steadily, and operating up to available capacity in peak periods. Together, the *Metropolitano* BRT and Metro Line 1 carry about a million trips a day but these account for only 5 percent of the 22.3 million daily trips (including trips in private modes and by foot). This growing demand for mass transit services supports the case for more public transport investments in the LMR, particularly on an east-west alignment where currently no high-capacity services exist.

1.6 In December 2010, with the aim of expanding mass transit provision, the Central Government approved a Metro Network Plan for Greater Lima and Callao. This Plan includes Metro Line 1 and five new Metro lines totaling 168 kilometers network. Following the results of a pre-feasibility study, the Government of Peru approved a new subway line consisting of the full 27.3 kilometers of Line 2 and a 7.7 kilometers segment of Line 4 as the top urban transport priority.

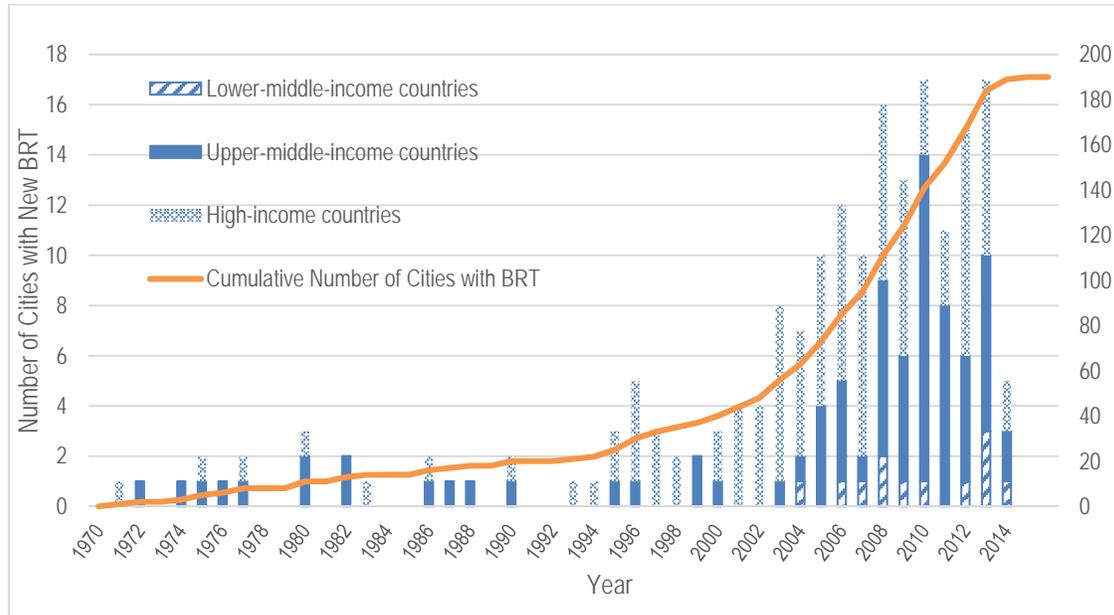
### **Experience and Lessons from Bus Rapid Transit Systems Worldwide**

1.7 Around 200 cities in the world have BRT systems to facilitate transportation, and cities in Latin America are important sources of knowledge and experiences for the recent global expansion of BRT systems (Figure 1). The modern BRT system first became operational in Curitiba (Brazil), and Quito (Ecuador) followed by cities in Brazil. It was, however, *Transmilenio* in Bogotá (Colombia) that provided a regional and international momentum to spread the BRT model. Brazil and Mexico support BRT projects, and BRT projects are expanding other parts of the world under rapid urbanization with limited fiscal space, such as cities in China and India (Figure 1 in Annex C). The Bank's support for BRT has mainly been in middle-income countries (Table 1 in Annex C).

1.8 Lima pioneered a prototype of the modern BRT system in Latin America. The concept of segregated lanes was first introduced in Lima along *Vía Expresa* around 1970. This concept does not meet the modern BRT criteria, but policy makers in Curitiba in Brazil visited Lima (Ardila-Gomez 2004), and built their own modern BRT system partly based on the experiment in Lima. The prototype continued until early 1990s, when

ENATRU went bankrupt (OVE 2015). The Metropolitan BRT effort supported by the project was prompted by the BRT success in Bogotá, Colombia.

**Figure 1: Bus Rapid Transit System Development in the World over Time**



Source: IEG using data from Global BRT Data (<http://brtdata.org/>)

Notes: The country income categories are based on the World Bank classification. The commencement year and counting cities are based on Global BRT Data. For instance, BRT system in Lima is counted in 1972 when the prototype of BRT system was developed. This graph does not include BRT system under preparation.

1.9 Recent literature (Cervero and Dai 2014) suggests that BRT systems have gained prominence worldwide as a cost-effective alternative to urban rail investments. However, some people question the city-shaping potential of BRT, in part due to a belief that it delivers fewer regional accessibility benefits than rail, but also to the social stigma assigned to bus-based forms of mass mobility. Notwithstanding the success of cities like Curitiba and Ottawa at integrating BRT and land development, doubt remains over BRT's ability to promote less car-dependent, more sustainable patterns of urban growth in rapidly motorizing and suburbanizing cities.

1.10 Notably, the thinking is that BRT should be conceived as more than mobility investments. They also present opportunities for restructuring urban and regional growth in more sustainable formats. BRT can serve as a back bone for guiding growth in a more compact transport model that not only promotes transit riding and less driving, but also curbs sprawl and the significant costs associated with it. The cases of Bogotá and Ahmedabad reveal that in the absence of proactive planning and attempts to entice private development near stations, few land-use changes occur. In both cases, long-range strategic planning and urban development objectives have been largely usurped by near-term engineering and cost-minimization objectives, resulting in lines being routed and stations sited in areas with minimal development potential. This seems to imply that urban planning needs to strike balance between short-term problem-solving and an ethos of forward-looking and strategic planning.

## World Bank Support for Peru's Transport Sector

1.11 The World Bank Group has played an important role in supporting the transport sector in Peru over the past two decades providing over US\$700 million for investment in both urban and rural areas, policy reform and technical assistance. A list of Bank-financed transport projects in Peru since 1994 is provided in Annex B.

1.12 The Bank is supporting two projects in the urban transport sub-sector in Peru after the Lima Transport Project was completed in 2011. The first is the US\$300 million Lima Metro Line 2 project, which aims to improve connectivity between east and west of the city for better access to job and services. Between 2012 and 2016, the Japanese Policy and Human Resources Development Fund (PHRD), is supporting a 'Universal Mobility in Lima' project, managed by the Bank, which provides US\$3 million to improve the capacity of MML and to mainstream the needs of disabled persons in the planning and implementation of urban walking and public transport facilities, including Metropolitano.

## 2. Objectives, Design, and their Relevance

2.1 According to the Loan Agreement dated June 2, 2004 (Loan No. 7209-PE), the project development objective was "to assist the Borrower in enhancing the economic productivity and the quality of life in the Borrower's municipal territory by improving mobility and accessibility for its population, especially in the peri-urban poor neighborhoods, through the establishment of an efficient, reliable, cleaner and safer mass transit system".

2.2 The GEF Grant Agreement (TF052856) states the objective identically to the Loan Agreement, and explicitly adds the promoting of non-motorized transportation: "enhancing the economic productivity and the quality of life in the Lima-Callao metropolitan area by improving mobility and accessibility for its population through the establishment of an efficient, reliable, cleaner and safer mass transit system and by promoting non-motorized transportation."

2.3 This report assesses the project based on the project development objectives in the loan agreement.

### Relevance of Objectives

2.4 *Relevance of the project development objectives is rated Substantial.* The project development objective was relevant to the Government's priorities as well as to the Bank's partnership strategies, both at project appraisal and closure.

2.5 The FY2002-2006 Country Assistance Strategy (CAS) covered investment programs which would have a direct impact on the productive lives of the poor. The global environmental elements of the objective were also relevant to the CAS's focus on environmental issues associated with health and sustainable use of natural resources. The FY2007-2011 Country Partnership Strategy (CPS) aimed at fostering environmentally sustainable economic growth by reducing urban air pollution and the transport infrastructure deficit. The strategic areas of the FY2012-2016 CPS covered improved

access of the poor to services and markets through better transport and infrastructure to reduce inequality.

2.6 The project development objective was also consistent with the development priorities of the Government of Peru at appraisal and at closure. The objective is in line with the 2006 Municipal Policy Guidelines for Public Transport in the Lima Metropolitan Area (Municipality Law No. 954), which underlines the importance of: (i) mass transport systems in corridors with high demand; (ii) the rationalization of public transport supply; (iii) the operational efficiency of public transport; and (iv) environmental sustainability, including the promotion of non-motorized transport. The promotion of bicycle use as an alternative mode of transport is explicitly foreseen in the Strategic Plan for Bicycle Transport and the new National Bicycle Law. The President's inaugural speech in 2011 stated that the Government would support the development of urban transport activities in Lima. These development priorities expressed in these strategies are broadly consistent with the project development objectives, but specific elements of project development objectives, such as quality of life, mobility and reliable services, could have been better articulated.

## Design

2.7 The IBRD-funded portion had six components.

**Component 1. Mobility and Environmental Improvement** (At appraisal: US\$99.92 million; At completion: US\$203.30 million): This component included physical infrastructure development for the BRT system with 15 subcomponents; (i) construction of 28.6 kilometers segregated busways, (ii) repaving of mixed traffic lanes adjacent to the new BRT corridors, (iii) sign posts and road makings along the corridors, (iv) traffic signal improvements in the vicinity of the corridors, (v) bus stations and terminals, (vi) bus depots, (vii) control center to monitor the bus operations, (viii) improvements of feeder roads to the two bus terminals, with an approximate length of 50 kilometers and GEF-funded sidewalks and bicycle path construction activities, (ix) road safety measures along the corridors, (x) improvements to pedestrian and vehicle traffic in five sensitive areas and recovery of public space, (xi) assistance for the relocation of a flower market in Barranco and informal street vendors affected by the project, (xii) environmental mitigation measures at the south-end of the station which is close to the environmentally sensitive area of Pantanos de Villa swamps, (xiii) improved air monitoring system, (xiv) road safety strategy development and its partial implementation, (xv) introduction of environment-friendly pilot vehicle scrapping methods. This component included designs to take into account the needs of vulnerable users, such as women, elderly, children and disabled people.

**Component 2. Social Mitigation and Community Participation** (At appraisal: US\$5.75 million; At completion: US\$2.42 million): This component consisted of 3 activities; (i) community consultation with users and operators to promote the use of BRT system, (ii) mitigation measures, such as training and loans for small-scale enterprises for current bus operators to minimize the negative impacts, (iii) technical assistance to operators outside the BRT system to strengthen their capacity in terms of route planning, service provision, maintenance, road safety and knowledge of laws and regulations.

**Component 3. Institutional Strengthening** (At appraisal: US\$3.67 million; At completion: US\$1.35 million): This component aimed to strengthen institutional capacity through 4 activities; (i) development and implementation of public transport policy (ii) monitoring and evaluation of the BRT, (iii) formal creation of Protransporte, which is the implementing agency of the project, and (iv) technical assistance and training for Protransporte, EMAPE (Empresa Municipal Administradora de Peaje de Lima), GTU (Gerencia de Transporte Urbano) and police.

**Component 4. Studies and Construction Supervision** (At appraisal: US\$8.58 million; At completion: US\$11.11 million): This component had three types of assistance; (i) construction supervision, (ii) studies on economic feasibility, environmental impact, and final engineering design to expand the BRT beyond the 28.6 kilometers scope of the project, (iii) social impact assessment of BRT system, such as user scorecards to evaluate its performance, beneficiary assessments through focus group discussions and household surveys.

**Component 5. Program Administration** (At appraisal: US\$5.58 million; At completion: US\$12 million): This component included operational expenses of the Protransporte and EMAPE, which were completely funded by the counterpart.

**Component 6. Grade Separation of Plaza Grau** (At appraisal: US\$10 million; At completion: US\$30.82 million): This component was entirely funded by Metropolitan Municipality of Lima (MML) for reconstruction at the Plaza Grau, which was one of the congested intersections in Lima and a key node of the BRT. The grade separation was required for the BRT system, and could reduce the car traffic lanes from three to two in each direction.

2.8 The GEF-funded portion consisted of four parts: (i) *Rationalization of the public transport fleet*. It provided financial incentives and experimented with different methods to scrap old and polluting public transport vehicles through the establishment of a credit guarantee fund. The training and micro-credit were also expected to mitigate the negative impacts of bus-scraping on transit operators and employees; (ii) *Promotion of a bikeway network*. This would be done through physical infrastructure development and educational awareness campaigns for users and local authorities; (iii) *Institutional strengthening for sustainable transport*. This consisted of an awareness campaign for environmental issues related to transport, trainings for concerned staff in MML, and capacity development for municipal and local district authorities and staff; and (iv) *Management, monitoring and evaluation, and replication strategy*. This included the design and validation portions of the project monitoring system, implementation of an automated data processing system, and design of a replication strategy and technical assistance for municipalities outside MML for sustainable transport.

## **Relevance of Design**

2.9 *Relevance of project design is rated Modest*. The project results framework provides a logical link between the activities to be financed by the project and the outputs and outcomes related to the attainment of the development objectives. The physical investments in the construction of the Metropolitan BRT system and related

improvements under Component 1 could be expected to establish an efficient, reliable, cleaner and safer mass rapid transit system, thus improving mobility and accessibility for the metropolitan population, especially in the peri-urban poor neighborhoods. In fact, the project is designed to connect poor residential areas in the north and south to central part of Lima where job opportunities, hospitals and educational institutions are located. Other factors, such as affordability and quality of social services, also play critical roles to improve mobility and accessibility, but it is reasonable to assume that project activities contribute to improve these intended outcomes. Interacting with other numerous factors, this in turn could be expected to contribute to enhancing economic productivity and quality of life for the region. The choice of BRT as a mass transit system was appropriate relative to the more capital-intensive options of a metro rail or monorail, particularly when taking into account the limited fiscal space for the country at the time of appraisal. The project design was relevant throughout the life of the loan, though it underwent two loan amendments and reallocation of funds to consultant services and audits as well as among other categories.

2.10 The GEF grant financed activities were directly linked to greenhouse gas reductions from ground transport in the Lima-Callao Metropolitan Area. These included the scrapping of old and polluting buses; and expansion of the bikeway network and promotion of bike use. The GEF grant was expected to reinforce these efforts by financing institutional capacity-building for environmental issues and transport planning, which would contribute to a long-term modal shift toward more efficient and less polluting forms of transport.

2.11 The project development objective contained several elements that required a clear definition: *cleaner, safer, reliable, and efficient* transport; *mobility, accessibility, and access for peri-urban poor neighborhoods*; and improvement in *economic productivity and quality of life*. Of these, *economic productivity, quality of life, mobility, accessibility, efficient, and reliability* were not defined clearly in project documents. Even if they could be measured satisfactorily, it would be difficult to relate outcomes of economic productivity and quality of life to the project's outputs and intermediate outcomes. In particular, economic productivity is influenced by a number of factors, and attribution to specific project output and outcome is hard to establish.

2.12 Another design weakness was that some of the key targets were not realistic. For instance, the project aimed to improve mobility by serving 600,000 passengers per weekday, but the BRT station infrastructure has already reached its capacity in peak hours showing, in retrospect, that the physical design was not commensurate with the forecast usage. Even if this mobility target were achieved, the objective of enhancing economic productivity and quality of life in LMR was also too ambitious given that the project impacted only five percent of the population in LMR. In addition, the global environmental elements of the project objective aimed to double the use of bicycles over the project period. However, experience from other project situations shows that it would require more than a decade to bring about such a change, and traffic conditions and driving habits needed to mature greatly to see such transformational impact.

### 3. Implementation

#### Planned vs. Actual Costs

3.1 The project cost at completion was US\$261.9 million, about 95 percent higher than the appraisal estimate of US\$134.4 million. The increase was attributable to both exogenous and endogenous factors. The exogenous factors included exchange rate fluctuation, global price increase of construction materials such as steel, cement, and fuel; and supply constraints faced by construction firms due to rapid economic growth in Peru during project implementation. The endogenous factors were complexity of contracts and changes made in engineering design. For instance, the Central Station on the Metropolitano BRT was built underground, rather than at ground level as originally envisaged, because traffic volume in this area is high and limited space is available for the BRT system. The Bank and Inter-American Development Bank (IDB) provided US\$45 million loan each as planned, and the remaining amount, including the increase in project costs, was entirely funded by the Borrower. The GEF-funded portion was US\$7.35 million at project completion, which was 93 percent of the commitment amount (US\$7.93 million).<sup>3</sup>

#### Implementation Experience

3.2 The project was approved on December 9, 2003. The IBRD-funded portion became effective nearly a year later on December 15, 2004, while the GEF portion became effective on August 31, 2004. The effectiveness of the IBRD-funded portion was delayed because of the initial difficulties faced by Protransporte, a newly created implementing agency, in completing the preparation of annual operation plan, staffing plan, institutional cooperation arrangements with other implementing institutions. A mid-term review was carried out on December 7, 2006. The IBRD-funded portion was ultimately extended by 22 months and closed on April 30, 2011, while the GEF portion was completed on June 30, 2010, having been delayed by twelve months. Figure 2 in Annex C summarizes the important project milestones.

3.3 The first restructuring was carried out on August 26, 2008, and involved reallocation of funds and extension of closing date for one year (June 30, 2009 to June 30, 2010), to continue the construction of the trunk line and provide time for the start-up and testing of the BRT system. The second restructuring, on December 17, 2009, also involved reallocation of funds with the remaining funds were reallocated to consulting

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<sup>3</sup> In addition to the US\$7.93 million commitment (TF52856), the Japan Social Development Fund (JSDF) grant provided US\$1.145 million commitment (TF52877) for the GEF-funded project, and US\$1.09million was disbursed. The JSDF grant was used to complement IBRD-funded project with the objective to (a) improve the quality of basic service delivery, (b) build wide ranging community capacity in poverty analysis, planning and project development, and (c) introduce institutional and administrative reforms that increase the engagement of poor residents in the local governance process. Moreover, Japan International Cooperation Agency (JICA) provided technical cooperation to prepare the Lima Urban Transport Master Plan, which eventually provided useful baseline and endline data for monitoring and evaluation, although JICA was not a co-financier for the IBRD and GEF-funded projects.

services and audits, and an extension of the closing date by 6 months (June 30, 2010 to December 30, 2010). The final restructuring extended the closing date by another 4 months (December 30, 2010 to April 30, 2011) so that the implementation unit and consulting services could finalize the contracts through reallocation of funds.

3.4 The GEF-funded portion also went through one restructuring. On March 26, 2009, the planned bus scrapping program was restructured into a study to integrate and rationalize public transport system in Lima because MML decided that Protransporte should undertake this activity with its own funding.

#### *Institutional arrangements*

3.5 The IBRD-funded activities were implemented by Protransporte, which was set up in 2002 (Municipal Decree No. 035) to undertake this project. As a financial and administrative autonomous agency, Protransporte's role was to provide effective, efficient and sustainable urban transport solutions, particularly for the poor or marginalized people in LMR. Additionally, EMAPE (Empresa Municipal Administradora de Peaje de Lima), which was a public institution under MML in charge of toll management, also supported the construction of BRT infrastructure financed by MML after the cost increase was identified.

3.6 The GEF-funded portion also had a dual implementation structure, which faced challenges in coordination. The National Environmental Fund (Fondo Nacional del Ambiente: FONAM), which was created in 1997 as a private autonomous institution (Law No. 26793), was the implementing agency. Its role was to support environmental protection activities, including bus scrapping and promotion of bicycle use, through financing and capacity development. The bicycle activities under the project were co-implemented with GTNM (*Gerencia de Transporte no Motorizado* – Non-Motorized Transport Bureau), which was created in 2003 as a separate non-motorized transport bureau in MML. GTNM also had a mandate to develop bicycle lanes and to conduct awareness raising to promote the use of bicycles. Some of these activities overlapped between FONAM and GTNM, rather than being complementary, leading to tensions in their working relationship.

#### *Political and government commitment*

3.7 The project benefited from strong political commitment during the initial years especially from the mayor of Lima, who was supportive of BRT system development. However, this did not always translate into favorable results. There was rapid turnover of the senior management team and professional staff of Protransporte which changed three times during the first three years of the project because of slow progress and disbursement. Following this, after August 2007, there was relative stability. In addition, because of its high visibility, the project became a magnet for political dispute. While political candidates agreed on the necessity of mass rapid transit systems in Lima, there was debate on the relative emphasis on the BRT and metro. Several months after the Metropolitano became operational in July 2010, the new mayor who took charge was more inclined towards an integrated transport system (Sistema Integrado de Transporte: SIT). Metropolitano was a part of SIT, but the focus of Metropolitano became ambiguous

which led to delays in extension of Metropolitano and underutilize the maximum capacity of the Metropolitano BRT system. Partly in anticipation of this change, the previous administration expedited the procurement of the full complement of 312 articulated buses<sup>4</sup> and 232 feeder buses for BRT. This resulted in an oversupply at a time when ridership was yet to increase, and therefore placed an additional burden on the private bus concessionaires (who were engaged for providing Metropolitano BRT services) to service the debt for buses that had not yet been put into use. MML eventually took on the burden of interest payments in consultation with banking institutions, Protransporte and the private bus concessionaires.

### *Weaknesses in Regulation*

3.8 There were weaknesses in enforcing some municipality ordinances relevant to the financial sustainability of the Metropolitano BRT. An important case in point is the 2004 municipality ordinance (Ordenanza No. 682) which was intended to prohibit other public transport service operating within 400 meters away on either side of the BRT corridor. This privilege was granted for private bus operators in order to secure stable revenue from passengers. Nevertheless, this was not imposed, as it became clear that with important highways and roads built alongside, it was unrealistic to ban all other public transport system within 400 meters of the BRT route. Hence, Metropolitano BRT's private bus concessionaires compete with other public transport services, with implications for risk-sharing under the public-private partnership arrangement, and potential underutilization of Metropolitano BRT services.

3.9 **Safeguards.** The project was classified as Category B under the Bank's environmental and social safeguard policies. Four safeguard policies were triggered: Environmental Assessment (OP4.01, BP4.01, GP4.01), Natural Habits (OP4.04, BP4.04, GP4.04), Cultural Property (OPN 11.03), and Involuntary Resettlement (OP/BP 4.12). The environmental assessment and resettlement plan were disclosed at the Bank website on June 30, 2003. Environmental assessments were carried out for both the IBRD and GEF-funded components. The impact of bus scrapping was analyzed. While there was no framework included for bikeway construction, the environmental and social considerations on bikeway constructions were addressed through a pragmatic learning-by-doing process.

3.10 According to the ICR, involuntary resettlement was carried out for flower market vendors near the Plaza de Flores BRT station, after initial resistance from them. Although the vendors were not owners of their original sites, Protransporte provided assistance to find credit for new land purchase and their relocation. A new flower market was built close to the Plaza de Flores station, with water and electricity infrastructure, and training for small business activities was provided to the vendors. The mission visited the resettled area and was able to confirm that the facilities were superior to those available to typical vendors in other places. Informal feedback from the vendors during the mission

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<sup>4</sup> An articulated bus comprises two rigid sections linked by a pivoting joint in accordion. This arrangement allows a longer overall length than single-decker rigid-bodied buses, and hence a higher passenger capacity, while still allowing the bus to maneuver adequately on the roads of its service route.

suggested that they were satisfied with the facilities, and have generally seen their businesses expand, and their incomes after relocation. The application of the safeguard policies to the GEF-funded portion faced some procedural issues, but according to the ICR, no major problems were encountered.

3.11 An Inspection Panel investigation was carried out in response to a Request for Inspection submitted by residents of the District Barranco within LMR. As described in the ICR, the requesters claimed health and safety concerns from increased traffic volume through re-routing as well as inadequate consultations on an environmental management plan or mitigation measures. The Inspection Panel's investigation report (2011) concluded that the project was not solely responsible for the adverse impacts because of the general increase in traffic volume from economic causes, and that the safeguards Category B was appropriate. However, the investigation report also pointed to shortcomings in the analysis of impacts on pedestrian and vehicle traffic flows beyond the BRT corridor; insufficient information provided to affected residents in Barranco; non-implementation of the appropriate re-routing traffic pattern recommended in a 2005 traffic study; inadequate traffic impact analysis for the Barranco area; and a lack of sound analysis on historic and monumental aspect of this district.

3.12 In response to the Inspection Panel's findings, the Bank provided technical assistance for traffic management through the consultations with residents in Barranco. A traffic management expert proposed traffic detours so that pedestrian rights were respected in the historic quarters. Protransporte officials informed the mission that no major complaints have been received following these developments.

3.13 **Financial Management.** The ICR notes that the financial management of the project was in line with the loan agreement though there were delays in submission of audit reports and interim financial reports. A high turnover of key financial management staff affected the continuity of operational procedures, and there were account reconciliation issues, which led to moderately satisfactory financial management ratings in Implementation Status Reports (ISRs), including the final one. The final external audit stated nonetheless that the accounting system and internal controls were in compliance with the covenants of the loan agreement. The GEF-funded portion encountered minor shortcomings in the initial stage, but all the audit reports were unqualified.

3.14 **Procurement.** Since Protransporte was newly established for the purpose of this project, there was limited procurement capacity in the initial stages. Anticipating this, the Bank requested Protransporte to employ two procurement specialists who were familiar with the Bank's procurement guidelines. According to the ICR, in spite of this, procurement took longer than the standard processing timeframe, and the Bank prepared an action plan to accelerate the bidding process. Recommendations through four ex-post procurement reviews and the Bank supervision mission also improved the management of procurement processes. The GEF-funded portion did not face major procurement issues, although there were initial minor shortcomings because of the implementing agencies' limited experience with Bank operations. The final ISR procurement rating was satisfactory.

## 4. Achievement of the Objectives

4.1 Achievement of the objectives is evaluated through outputs, intermediate outcomes, and outcomes. This evaluation first examines outputs, and then examine the sub-objective of “the establishment of an efficient, reliable, cleaner and safer mass transit system” as intermediate outcomes. The evaluation of the sub-objective on “improving mobility” and “accessibility for its population, especially in the peri-urban poor neighborhoods” follows as outcomes, and finally discusses the overarching objective of “enhancing the economic productivity and the quality of life in the Borrower’s municipal territory”.

### OUTPUTS

4.2 Construction of the first Bus Rapid Transit (BRT) corridor in Lima (Metropolitano): 26.78 kilometers of high capacity bus corridors with segregated traffic lanes dedicated for use by high capacity buses was completed. The final length was 2.62 kilometers less than the targeted 29.4 kilometers due to a realignment to meet environmental concerns relating to land used by migrant birds. The route connects the north and south peri-urban areas of Lima and has 35 BRT stations, including two terminals at the end of each trunk line stations in north and south. The mission confirmed that all the station and terminals are fully operational.

4.3 At project completion, 176 high-capacity buses and 197 feeder buses were operating, compared to the planned 312 and 232 respectively. The mission confirmed that presently, 300 articulated buses in trunk route and 222 feeder route buses are being operated collectively by four private bus operators with the concessions totaling US\$174 million for 12-year periods. The buses are of the modern articulated type for the trunk route, run on compressed natural gas (CNG).

4.4 An electronic fare collection system and a central control system for its management as well as monitoring, has been operational from the very beginning of Metropolitano BRT. This is managed by a private operator under a concession worth US\$24 million for a 14-year period.

4.5 Under the GEF-funded portion, 32.2 kilometers of bikeway was rehabilitated almost as planned. Two bikeways were constructed in Chorrillos (south cone). These bikeways were built on the side of the rehabilitated feeder roads on Avenida Guardia Civil, among other feeder roads. In the north cone, the Municipality built another bikeway perpendicular to Avenida Tupac Amaru, along Avenida Los Olivos. The mission visited selected areas and confirmed that the dedicated bikeways were being maintained. Bicycle parking spaces for bicycle riders were noted in Matellini bus station, which is located south end of Metropolitano. A national bicycle law was issued in 2010 to promote the use of the bikeways, parking construction and road safety measures. Three contracts were executed for reconstructing and repaving several streets in downtown Lima, and slightly widen sidewalks along these same streets.

4.6 A feasibility study for an east-west Metropolitano corridor was also prepared. Institutional strengthening activities were carried out for FONAM, GTNM, and district

municipalities. In turn, FONAM and GTNM provided training and conducted awareness raising campaigns to promote sustainable transport options, including the use of bicycles for school teachers and children. FONAM also worked on creating a brand image through a “Zoom Club” to promote the use of bicycle.

## INTERMEDIATE OUTCOMES

4.7 ***The sub-objective of “the establishment of an efficient, reliable, cleaner and safer mass transit system” is rated Substantial.*** The project produced the following intermediate outcomes in respect of efficient, reliable, cleaner, and safer mass urban transport. The definitions of ‘efficiency’ and ‘reliable’ system were not clear in project documents, and as a result, this report evaluated ‘efficiency’ in terms of travel time reduction from user’s perspective and operational cost from service provider’s perspective. The ‘reliability’ was measured through user satisfaction rate and quality rating of the BRT system. ‘Cleaner’ transport was evaluated in terms of improved air quality, and ‘safety’ was defined as less serious and fatal traffic accidents.

4.8 **Efficiency of BRT Services.** With the arrival of the Metropolitano, travel time for users along the route has been significantly reduced. According to Protransporte, overall average travel time from origin to destination for users has been reduced from 50 minutes to 38 minutes in 2013. According to private operators, the reduction varies between peak and non-peak hours, but with the arrival of the Metropolitano BRT, travel time through corridor from Naranjal (north cone) and Matellini (south cone) has fallen from 120 minutes to around 65 minutes. More than 65 percent of Metropolitano users<sup>5</sup> have consistently rated “quickness” as the most important value for the annual surveys conducted by Lima Cómo Vamos in the last three years. This was confirmed during the mission through informal interviews with Metropolitano users in Naranjal, Canaval y Moreyra, and Matellini stations.

4.9 A schedule of express and super express services was introduced during rush hours, to speed up the clearance of passengers from high-use bus stations. The planning of these schedules was enabled by analysis of large scale data compiled from the electronic fare collection systems. The electronic fare collection system also improved efficiency through reduced operational cost, and the project had efficiency gains from professional services through private concessions though some disputes continue between Protransporte and private operators related to risk sharing under the public private partnership.

4.10 **Reliable BRT Services.** According to Protransporte, ‘user satisfaction’ has increased steadily every year, beginning from 40 percent in 2010, and stood at 90 percent in 2014, exceeding the original target of 82 percent. However, a survey conducted by an independent entity, El Comercio-Ipsos, found user satisfaction with Metropolitano to be 64 percent. Another independent survey which was conducted by Lima Cómo Vamos, a civil society organization, measured user satisfaction (percentage of user ranking service as ‘good’ or ‘very good’) across different transport modes. It found that Metropolitano with 57.5 percent ranked behind Metro Line 1 (elevated electric train) with 70 percent,

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<sup>5</sup> The proportion of people who used Metropolitano in the last 12 months.

but exceeded other modes – minibus, mototaxi, bus, and taxi – which ranged between 9.5 percent and 49.2 percent (Table 1).

4.11 Yet, people used Metropolitan (38.7 percent) more often than the metro (30.1 percent). Since 66.8 percent of respondents in 2014 best valued reduction in travel time, the “reliable” service is highly correlated with “efficient” service, but some users also acknowledged different aspects of Metropolitan, such as punctuality, low cost of services, comfort, security and cleanliness.<sup>6</sup> Taking into account that the Metropolitan fare is higher than metro and other short-distance with traditional public transport,<sup>7</sup> current user satisfaction rate was substantial even though the rate did not achieve the original target through independent external surveys. Also, while reliability of service is often measured by compliance with time tables, this is not possible in the case of Metropolitan buses, which are operated every three to five minutes depending on the peak and non-peak hours without specified timetables.

**Table 1: User Satisfaction Rates for Urban Transport Services in 2014**

	Minibus	Mototaxi	Bus	Taxi	Metro-politano	Electric Train
Share of respondents using transport mode in the last 12 months (%)	88.7	65.6	80.9	79.4	38.7	30.1
User satisfaction rate (%)	9.5	19.9	21.6	49.2	57.5	70.0

*Source:* IEG using data from Encuesta Lima Cómo Vamos (2014)

*Notes:* User satisfaction rate is the proportion of people that have used a transport mode in the last 12 months and responded with 'good' or 'very good' for its service. Sample size of the respondents is 1,920.

4.12 In 2013, Metropolitan received a gold quality rating from the Institute for Transportation and Development Policy (ITDP 2013),<sup>8</sup> which uses a scorecard system, based on criteria including service planning, infrastructure, stations, communications, access and integration. Among 98 BRTs evaluated around the world, only 15 BRTs have qualified for the gold standard.

4.13 **Cleaner BRT Services.** Metropolitan BRT’s fleet of high-capacity buses use compressed natural gas (CNG) for fuel, which is unique among BRT systems around the

<sup>6</sup> For those who used Metropolitan in the last 12 months, the follow-up question was “Can you tell us what is the best valued aspect of mobility service provided by the Metropolitan?”, and the interviewee could select one of the following response options: quickness (66.8 percent), punctuality (6.7 percent), low cost of services (6.5 percent), comfort (5.3 percent), security (4.6 percent), cleanliness (4.5 percent), order (3.0 percent), signals and message guidance (1.9 percent), personal treatment (0.9 percent), Don’t know (0.0 percent). The figures in the parentheses are based on 2014 survey.

<sup>7</sup> The fare of the metro line 1 was 1.5 soles for adult, which was 0.5 soles less than Metropolitan. The fare of the metro line 1 was subsidized by the central government, but Metropolitan’s fare was not subsidized. Other traditional bus fare used distance-based fare systems.

<sup>8</sup> The Institute for Transportation and Development Policy works with cities worldwide to bring about transport solutions that cut greenhouse gas emissions, reduce poverty, and improve the quality of urban life. <https://www.itdp.org/>

world. The use of low-polluting CNG and modal shift from higher polluting motor vehicles is seen to have contributed to the overall decline in pollutants (such as PM10, PM2.5, SO<sub>2</sub> and NO<sub>2</sub>) in Lima over the past few years.<sup>9</sup> According to the verified carbon standard monitoring report (2015),<sup>10</sup> it is estimated that more than 200,000 tons of CO<sub>2</sub> emission reductions were achieved under the project for the last three years between July 2011 and June 2014. The direct observation by the mission also found that an articulated bus and feeder bus have more carrying capacity than a traditional minibus. They were also cleaner than other traditional modes of public transport. Figure 2 shows a typical articulated bus and traditional minibus used in LMR.

4.14 In addition, from 2012, approximately 2,000 old and relatively higher polluting micro and mini buses were scrapped by Protransporte. The project planned to use GEF funds initially, but this task was taken over by Protransporte which committed more than US\$12 million to the effort. The majority of people in Lima perceive that serious environmental problems are attributable to pollution by vehicles (Lima Cómo Vamos 2014). The modal shift to Metropolitano and scrapping of old, pollution-causing buses would be expected to have a positive environmental impact in LMR.

**Figure 2: Metropolitano Articulated Bus and Traditional Minibus**



4.15 **Safer BRT Services.** The number of serious and fatal accidents in the main corridor has fallen significantly from a level of 26 per month that was experienced prior to Metropolitano BRT commencing operations. During 2012, 2013 and 2014, the number of fatal accidents was 1, 0, and 2 per month respectively, and the number of serious accidents were 13, 18 and 16 per month, respectively. While these results did not meet the goal of reducing the fatal and serious accidents by 40 percent compared with the baseline value, which was 26 fatal or serious accidents per month on average, the

1.1 <sup>9</sup>Air quality has improved even in the western and eastern part of LMR which was not directly related to north-south line of Metropolitano. Other factors were the introduction of the elevated electric train in Metro Line 1 in 2010; restrictions on importing used vehicles; regulations relating to use of low-sulfur diesel, etc.

<sup>10</sup> The monitoring report was prepared by Carbon Solutions Group Latin America S.A.C. The monitoring period cover between July 2011 and June 2014, and quantified greenhouse gas (GHG) emission reductions for the high capacity segregated corridor (COSAC 1).

improvement is significant given that the overall traffic volume has increased in this corridor over the past few years. Professionally trained bus drivers and improved traffic signage are expected to have contributed to an improvement in road safety in the corridor.

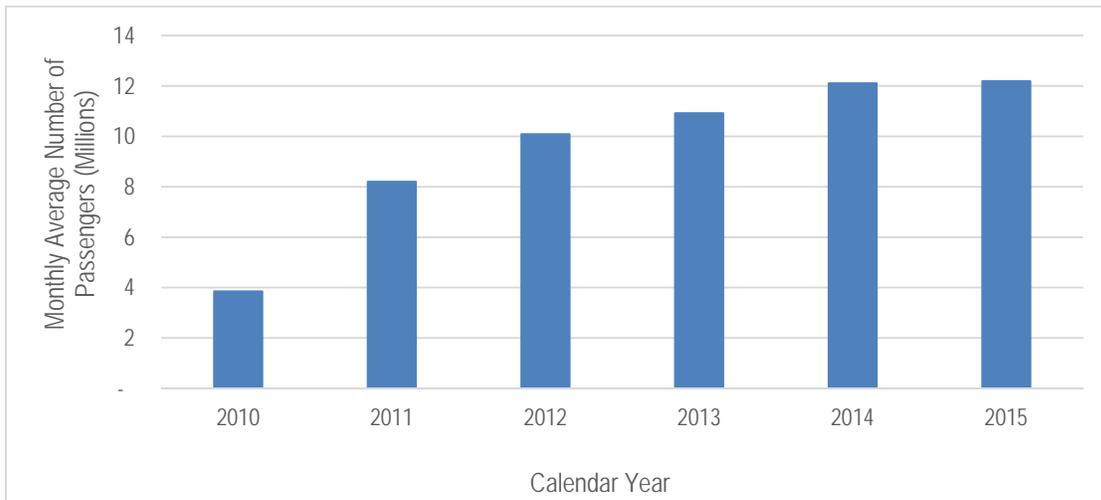
4.16 However, a clear reduction in traffic accidents could not be seen in the case of the feeder routes, which do not have the benefit of segregated bus lanes, and have less traffic safety sign posts than on the main Metropolitan BRT corridor. The feeder private bus operators expressed concerns that unregulated traffic and bad road conditions were contributing to traffic accidents, which also pushed up the operational cost of feeder bus services.

## OUTCOMES

4.17 *The sub-objective of “improving mobility” is rated Substantial.* With respect to mobility, this evaluation defines it as “movement of people or goods” (Litman, 2011, p4), and mobility is measured through the number of passengers per weekday and increased bicycle ridership. The number of passengers using Metropolitan BRT has grown to about 525,000 per weekday at the time of the PPAR mission. This compares to 340,000 passengers per weekday recorded at the time of preparation of the ICR, and it comes close to the limit in peak-hour. This figure was still short of the targeted 600,000 passengers per weekday, and the assumption of 713,000 used in the bidding documents for the bus operator concessions.<sup>11</sup> Estimates at appraisal did not take into account waiting time at stations and queues to board a BRT bus. This meant that travel time was underestimated, setting up more difficult targets for the project. One of the important factors which prevents from meeting the original target values could be underestimation of total travel time. Overall, there has been a growing trend in usage of BRT over the years, especially between mid-2010 and end-2013, after which, the growth has been slower (Figure 3). Currently, the Metropolitan bus runs every three to five minutes for the main corridor, and all available 300 articulated buses and 222 feeder route buses are operational.

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<sup>11</sup> If the number of people using both trunk and feeder routes is counted separately (validations), 670,000 validations were observed per weekday in June, 2015.

**Figure 3: Number of Passenger and Ticket Validation per Month Since July 2010**

Source: IEG using data from Protransporte

4.18 The GEF-funded activities aimed to double bicycle use in LMR. The JICA urban transport master plan data suggested that the number of people using bicycle as a primary mode of transport remained 0.4 percent in LMR population in 2012. With 30 percent of poor households owning bicycles, there was potential for increasing their usage (JICA 2013), but discussions with FONAM and other respondents indicate that the number of bicycle trips is far below the original target of doubling the baseline value. The project activities were implemented as planned, but it may require a considerable number of years to see significant growth in bicycle usage. Experience from other projects suggests that it requires a major attitude and cultural change.

4.19 *The sub-objective of “accessibility for its population, especially in the peri-urban poor neighborhoods” is rated Substantial.* This report defines accessibility as “ability to reach desired goods, services, activities and destinations” (Litman, 2011, p5). This evaluation examines the purpose of the trips as a good proxy for assessing accessibility because it involves the notion of ability to reach desired destinations. In fact, an analysis of the data for 2012 from the urban transport master plan prepared by JICA (2013) shows that the largest usage of Metropolitan BRT was for attending work (60 percent) and high school or college (20 percent).<sup>12</sup> More specifically, Figure 4 compares the occupation between Metropolitan users and all transport users, and it is evident that employee uses Metropolitan far more than general transport users in LMR. The proportion of users with university or high school student background also stands out. These findings are also triangulated with the Metropolitan card transaction data, which suggests that a large proportion of passengers begin their trip in the north or south

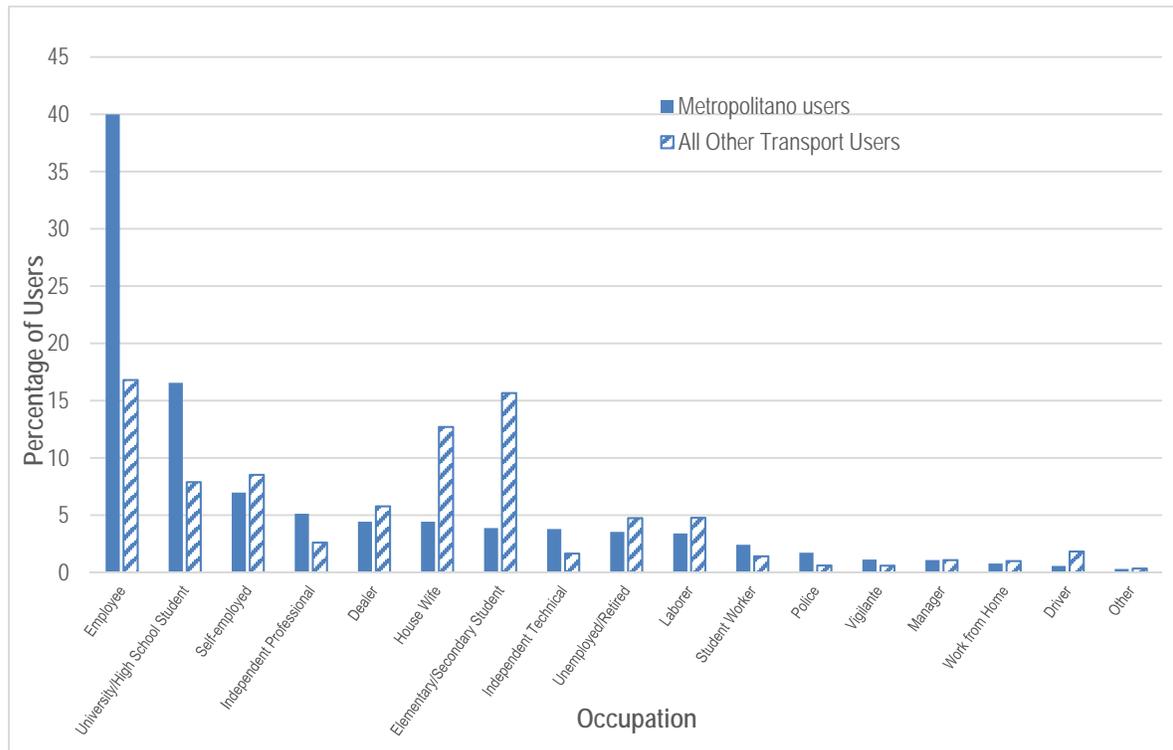
<sup>12</sup> For the purpose of the trip, 31.5 percent responded with ‘work’, 10.6 percent answered ‘study’, and 46.3 percent picked the option “back home”. Assuming that most travel is symmetrical, about 60 percent and 20 percent use Metropolitan for commuting to work and attending school/college. Other response options included shopping, eating, exercise, outing with family, walking, and recreation.

terminal (including feeder route stations) in peri-urban areas, and head for the central part of Lima which offers many job opportunities and social services (Figure 3 in Annex C).

4.20 The project also improved accessibility for disabled people through the Metropolitan BRT. The system has integrated traffic markers and ramps for disabled people at its stations from the beginning of its operations. The articulated bus has designated spaces for disabled people. The mission met with four disabled persons that were involved with an on-going PHRD<sup>13</sup>-funded Bank project on Universal Mobility in Lima. While this PHRD-funded project is beyond the scope of this assessment, the respondents confirmed that this was the first public transport system in Lima that made systematic provision for disabled people. They noted that Metropolitan is faster and cheaper transport option for the disabled people to head for job and essential social services, such as hospital and educational institution. Nonetheless, there is ample scope for improvements. For instance, while security guards monitored the usage of elevators meant for use by the disabled, elderly, and women with young children, it is difficult for disabled people to navigate the station and crowds during peak hours. Physically, there is certain gap between the edge of the bus station platform and entry to the bus, which is difficult for wheelchair-bound and blind persons to negotiate. In practice, disabled persons have to depend on a security guard when available, or voluntary help from other commuters. Most of the feeder route buses do not have provisions for disabled persons. These issues are not necessarily unique to Metropolitan, but require attention for improvements.

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<sup>13</sup> The Japan Policy and Human Resources Development Fund (PHRD) supports, among others, a technical assistance program for preparation and implementation of many Bank-financed operations.

**Figure 4: Metropolitano Users vs All Transport Users by Occupation in 2012**

Source: IEG analysis using data from JICA (2013)

Notes: The bar chart shows percentage of people using Metropolitano as primary means of transportation (sample size is 2,326) versus those using any means of transport except walking (sample size is 117,244).

4.21 Despite substantially increasing accessibility, the Metropolitano BRT system and infrastructure are showing signs of reaching the limits to their capacity, particularly in the most frequently used bus stations in peak-hours. The mission observed that during peak travel hours, the most used bus stations are congested with people and buses, with long lines in front of ticket counters and buses (Figure 5), though the lines move quickly. There are some instances where BRT buses do not carry many passengers in non-peak hours, BRT bus service programming, such as time table and routes, might be improved to accommodate the growth in demand. However, better use of BRT services might eventually require additions to the bus fleet, but more importantly, an expansion of Metropolitano's infrastructure because carrying capacity of bus stations infrastructure strained beyond its limit in peak-hours.

**Figure 5: Metropolitano Users in Bus Station and at Fare Card Machines in Morning Peak-Hour at Naranjal Terminal**



Source: IEG.

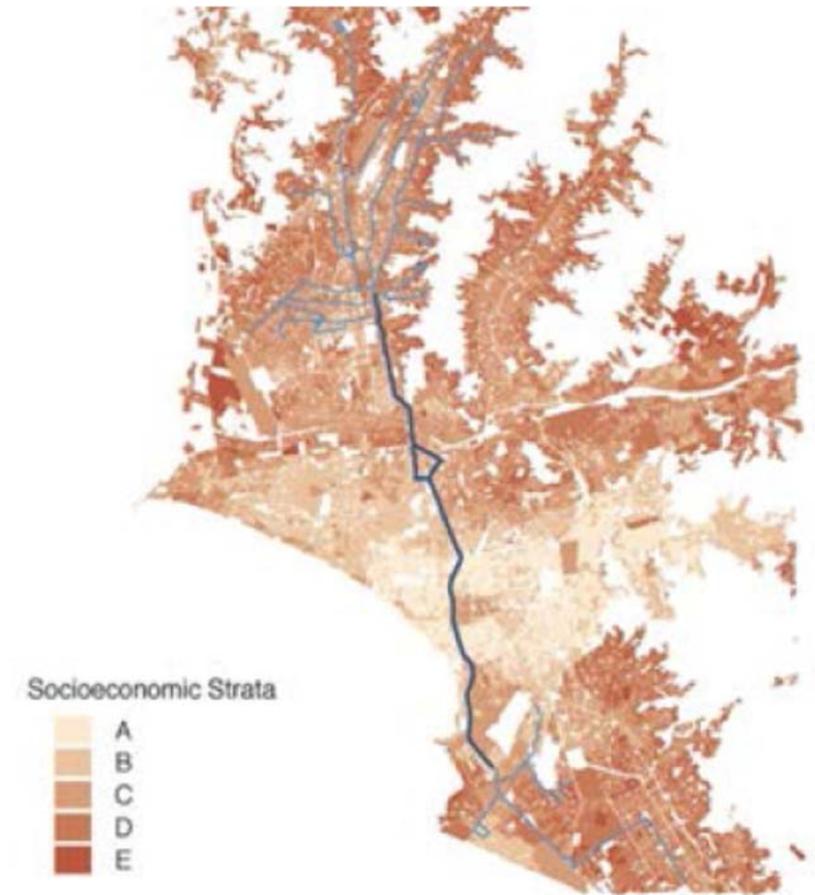


Source: IEG.

4.22 With respect to the increased access to poor residents in peri-urban area, there is reasonable evidence to show that it was significantly achieved based on the geographical location of bus stations. An analysis of survey data from the JICA urban transport master plan (JICA 2013) shows that Metropolitano BRT connects peri-urban areas in north and south of the Lima, areas with a relatively greater proportion of lower income residents, through the central business district in Lima. A relatively larger number of commuters enter through the bus stations at the northern and southern extremes, especially at the Naranjal station which is at the northern end of the trunk route. From the north and south terminals, several different feeder routes link to peri-urban areas (Figure 6).

4.23 Currently, Protransporte estimates that 80 percent of Metropolitano users came from the relatively lower-income peri-urban areas. A more thorough analysis based on data from the JICA urban transport master plan (JICA 2013) shows, however, that the BRT services were more likely to be benefiting the people from middle or even high socio-economic status, relative to the poor (Figure 7). The master plan classified people into five socio-economic status, and people from the lowest socio-economic status using Metropolitano were a lower proportion (2 percent) than non-users in LMR (10 percent). Similarly, the proportion of people from low socio-economic status classification with Metropolitano users are nearly half of non-users. When it comes to income distribution (Figure 4 in Annex C), about 20 percent of Metropolitano users earn between 731 and 1,030 soles (US\$280 and US\$345) per month; 17 percent of users between 1,031 and 2,700 soles (US\$345 and US\$900). Only 7 percent of the users came under the poor income category (less than 731 soles or US\$280).

**Figure 6: Coverage of Metropolitano in Relation to Socioeconomic Distribution of Lima Metropolitan Region**



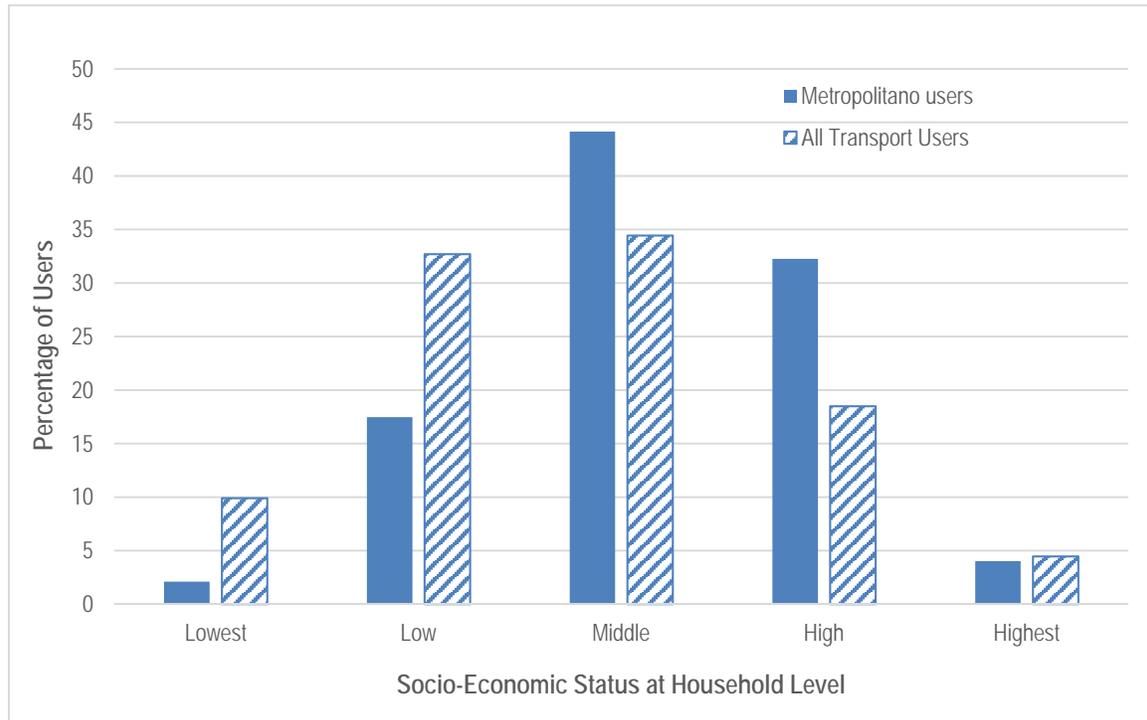
Source: OVE (2015)

*Notes:* OVE (2015) used JICA urban transport master plan data (JICA 2013), and the Socio-Economic Status was developed using (a) household income level, (b) educational background of the household head, (c) housing conditions, (d) number of rooms, (e) vehicle ownership and (f) ownership of electrical appliances (JICA 2005). There are five socioeconomic strata, and A is highest and E is lowest. The black line represents the Metropolitano, and gray line stands for feeder routes from north and south end of terminals.

4.24 This finding was consistent with the poverty analysis of the Office of Evaluation and Oversight at IDB (OVE 2015). The OVE conducted a perceptions analysis for the poor and very poor,<sup>14</sup> and 57 percent of the sample from the very poor responded that they never used the Metropolitano during the previous week, while the figure was only 26 percent for the sample from the poor. Figure 6 shows that Metropolitano BRT provides access to poor peri-urban areas inhabited by people with relatively lower socioeconomic levels, but the very poor might not get necessarily benefit proportionately. While the project used geographic socio-economic targeting, it did not necessarily translate into improved access for the very poor.

<sup>14</sup> In INEI classification, the people who belong to the lowest socioeconomic status (Stratum E in INEI classification) are considered very poor. Similarly, people with low socioeconomic status (Stratum D in INEI classification) are considered poor.

**Figure 7: Distribution of Metropolitan Users vs All Transport Users by Socio-Economic Status**



Source: IEG using data from JICA (2013)

Notes: The Socio-Economic Status was developed by (a) household income level, (b) educational background of the household head, (c) housing conditions, (d) number of rooms, (e) vehicle ownership and (f) ownership of electrical appliances (JICA 2005). JICA urban transport master plan classified socio-economic status into five, and this graph followed JICA urban transport master plan methodology and data. If the household includes at least one Metropolitan users, such household is defined as "Metropolitano users" (sample size is 1,042 households). "Others" did not include any household members who use Metropolitan as primary means of transportation (sample size is 21,661 households).

4.25 Affordability of fixed rate tariff structure is likely to affect the accessibility for the poor, and although the Metropolitan BRT does not have targeted direct subsidy for the poor, a cross subsidy tariff structure was in place since 2014. Initially, Metropolitan BRT users paid a fixed rate of 1.5 soles (US\$0.47) and 1.0 soles (US\$0.31) for trunk and feeder routes, respectively. Because the feeder route traffic volume was less than expected, the 2014 tariff update incorporated a cross subsidy system vis-a-vis the trunk routes to enhance accessibility for the feeder route users.<sup>15</sup> The profitable trunk route users (either trunk route only or both trunk route and feeder routes) paid 2.5 soles (US\$0.78), and feeder route only users paid 0.5 soles (US\$0.16). In other words, 0.5 soles for feeder routes are not commercially viable given the current number of passengers, but collecting 2.5 soles from trunk route users can generate profits by covering the deficit in feeder routes. Another point to note is that students can receive 50

<sup>15</sup> The tariff was first raised in 2012, and an integrated fare system was introduced. More specifically, people that use only the trunk route, and those who use both the trunk and feeder routes paid 2.0 soles (US\$0.63), and feeder route only users paid 1.0 soles (US\$0.31). The fixed rate tariff was raised in 2012 and 2014, but the 2014 update provided for the poor through cross subsidy tariff structures.

percent discount for using Metropolitano BRT from the beginning of its operation, which is the same discount rate for other public transport systems in Lima.

4.26 Despite these efforts to improve accessibility, according to the OVE (2015), 48 percent of the very poor and 40 percent of the poor using other public transport reported that the Metropolitano BRT did not connect them to the locations they needed to reach in the city. Metropolitano did not earn a good score for integration with other forms of public transport. The latter needs to be addressed for better service delivery for the citizens, and there is some progress in this respect recently. For instance, Metro Line 2, which is under construction, will have at least one transfer station to the Metropolitano. The central government and the financiers, including the Bank, are fully aware about the need for physical and fare system integration because GEF-funded study for transport integration became one of the important basis for the development of Metro Line 2. As described in Figure 8, other Metro Line planning and Metropolitano extension plans<sup>16</sup> could further enhance the utilization of Metropolitano if they were designed well. Metro Line 3 will run parallel to Metropolitano, and this network requires careful design. Better integration with public bus system is needed to enhance mobility and accessibility, particularly for poor residents of the peri-urban areas.

**Figure 8: Future BRT and Metro System in Lima Metropolitan Region**



Source: Autoridad Autónoma del Sistema Eléctrico de Transporte Masivo de Lima y Callao (AATE)

<sup>16</sup> Other than new extension plan to the north, Protransporte has two other plans; (i) 2.59 kilometers to the east connecting Metropolitano's Central station to the Grau station in Metro Line 1; and (ii) west from Metropolitano's Thomas Valley station toward the airport (6.5 kilometers).

4.27 The OVE (2015) also found that 82 percent of Metropolitano users considered that tariff system was either fair or inexpensive, which suggested that affordability was not a primary driver for a person deciding not to use the Metropolitano BRT. Nevertheless, it is significant for the very poor because 35 percent of very poor respondents feel the fare is high.

4.28 The very long queues to access the Metropolitano was the next most quoted reason for not using the system (OVE 2015). The other transport options,<sup>17</sup> such as minibus or taxi, can bring people directly to the destination with distance-based fee and less waiting time, and the poor people, particularly the very poor, might have incentive to use Metropolitano BRT when traveling longer distances that are within reach through the system. Despite these nuanced heterogeneous effects, the project development objectives intended to improve accessibility for the population, especially in the peri-urban poor neighborhoods, which was substantially achieved.

## OVERARCHING OUTCOMES

4.29 The overarching objectives -- “enhancing the economic productivity and the quality of life in the Borrower’s municipal territory” -- are difficult to measure or attribute to the Metropolitano BRT to any degree of certainty. In this context, it is important to note that only 1.74 percent of sampled individuals and 4-5 percent of households in Lima use the Metropolitano (JICA 2013). An analysis of the survey data by Lima Cómo Vamos does not show a statistically significant difference between users and non-users in respect of general perception about quality of life in 2014.<sup>18</sup> The economic productivity and quality of life are determined by numerous other factors, and establishing causality especially relative to the general economic growth over the past decade in the city, would require additional evidence.

## 5. Efficiency

5.1 *The efficiency of the project in meeting its objectives is rated Substantial.* After implementation began, the project had to undergo design changes that were not foreseen earlier, contributing to higher costs and time delays. There was a cost overrun of 95 percent at project completion compared to the estimate at appraisal. The basis for the benefit stream assumed at appraisal proved to be too optimistic, with the original target of passengers per weekday being almost reached five years later than expected. The full complement of high-capacity buses were procured upfront, and it took significant time to fully utilize them. The project preparation took seven years, and in addition, the project closing date experienced a total extension of 22 months. Despite the preemptive action to

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<sup>17</sup> The affordability of other transport options affect the choice of transport mode, but it’s difficult to pin down and compare the cost because other transport options are distance-based fee except Metro Line 1. Metro Line 1 is fixed rate and users need to pay 1.5 soles.

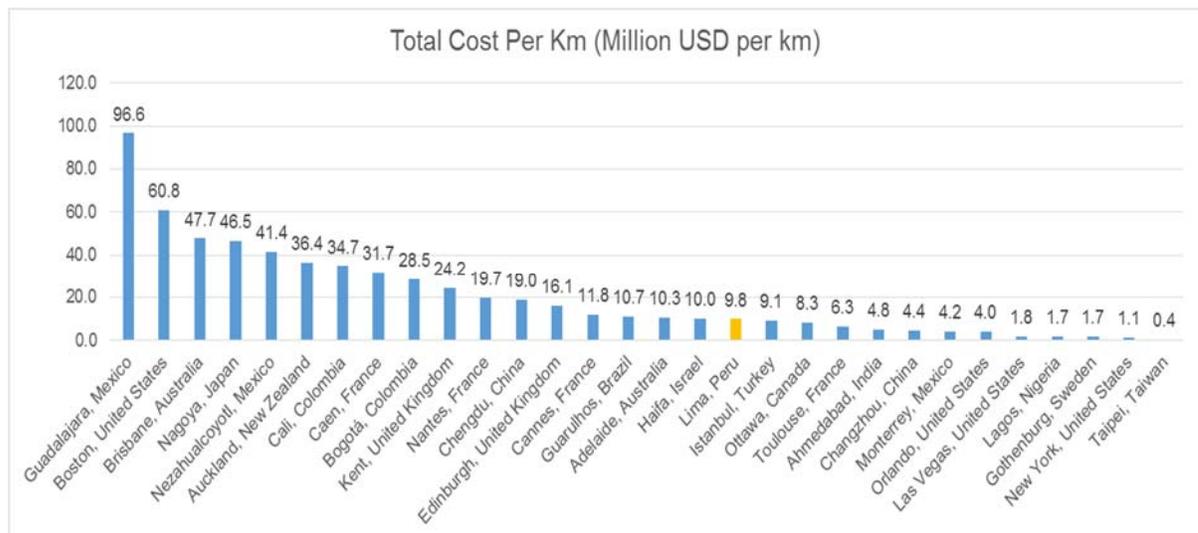
<sup>18</sup> The result of a t-test for this hypothesis is not statistically significant at 10 percent level. Note that Metropolitano users are defined as those who used Metropolitano in the past 12 months (Lima Cómo Vamos, 2014), and unlike JICA master plan data, they do not necessarily use Metropolitano as primary means of transportation.

employ procurement staff as part of effectiveness conditions, the complexity of contracts and changes made in engineering design also contributed to cost overrun and delays.

5.2 The Economic Rate of Return (ERR) at project completion was an estimated 19.5 percent compared to 20.7 percent at appraisal. However, the figures are not strictly comparable due to some differences in assumptions. At appraisal, the benefits of the system were calculated by estimating the demand and calculating the benefits in time savings to users and savings in vehicle operating costs for the new buses. The ex-post analysis, however, additionally included benefits stemming from generated demand, from the reduction in greenhouse gas (GHG) emissions, and from fewer accidents along the corridor. In addition, the ERR at completion benefited from other factors, such as fewer buses than initially estimated being required to replace the larger, aging fleet. The project team clarified that the monetized value of “other benefits” in the ex-post analysis due to reductions in GHG emissions and road accidents are a very small share (5%) of the total benefits of the project.

5.3 However, the project fares relatively better in overall cost-effectiveness. The total cost per kilometer is US\$9.8 million for Metropolitano, which is significantly lower than Bogota (Colombia) and Chengdu (China). (Figure 9). According to the project team at the World Bank, a cross country case study also suggests that the relatively long demand ramp-up period observed in Metropolitano is not unique, and other BRT system, such as Bogota (Colombia) and Monterrey (Mexico), experienced similar take-off period from initial operation.

**Figure 9: Benchmark of capital costs in BRT systems.**



Source: BRT Data ([brtdata.org](http://brtdata.org))

## 6. Ratings

### OUTCOMES

#### 6.1 Overall project development outcome is rated *Moderately Satisfactory*.

Relevance of the project development objective is rated **substantial** because of its alignment with both the country and Bank's strategies and priorities. Relevance of the project's design is rated **modest**. The project had logical linkage between inputs, outputs, intermediate outcomes, and outcomes, but several indicators and key objectives could have been more clearly and realistically formulated. Efficacy of the first sub-objective "the establishment of an efficient, reliable, cleaner and safer mass transit system" is rated **substantial** due to tangible achievements in providing such urban transport services through the BRT system. The second sub-objective, comprising "improving mobility" and "accessibility for its population, especially in the peri-urban poor neighborhoods", is also rated **substantial** because of increasing traffic volume and usage for commuting to the workplace and higher education. Although the benefit for the poor might be less than for the non-poor, and the very poor appear to have benefited hardly at all, the project improved connections between the poor residential areas in the northern and southern parts of LMR. The overarching objective of "enhancing the economic productivity and the quality of life in the Borrower's municipal territory" has difficulties in measurement and attribution, but substantial achievements for the other two sub-objectives are likely to have contributed favorably to the overarching objective. Efficiency is rated **substantial** due to relatively favorable cost-effectiveness compared to other similar projects in other countries, even though operational and administrative inefficiencies, reflected in large cost and time overruns, are significant. On balance, the project development outcome is rated **Satisfactory**.

### RISK TO DEVELOPMENT OUTCOME

6.2 The main risks relate to financial sustainability, service quality, and politics. They are rated **Significant**. Private bus operators report that their operations are profitable, but they still face *financial risks* stemming from their obligation to repay their debts in full and eventually replace their bus fleets. Financial sustainability may be undermined by the fact that the municipality ordinance No.682 restricting competing public transportation services within 400 meters on either side of the Metropolitan corridor has yet to be enforced. Moreover, neither MML nor Protransporte have provided minimum revenue guarantee in the private concessions.

6.3 The unbalanced risk allocation between private and public components could affect *the sustainability of service quality* since private operators have no other choice but to reduce operational cost or postpone to repayments of the debt relating to the bus fleet to the financing banks (OVE 2015). The performance of Metropolitan is strongly influenced by *variations in policies and preferences* that have accompanied changes in political leadership, particularly in the mayoralty of Lima. There is also a risk of turnover of top management with changes in political leadership as shown by the abrupt replacement of members of Protransporte's top management in June 2015.

6.4 In addition to political risk within MML, there are political tensions between MML and the Ministry of Transport and Communications (MTC), which appears to have prioritized the Metro over BRT extension. The metro network plan can help Metropolitan enhance its sustainability if physical and fare collection integrations are in place through sound institutional coordination. The demarcation of responsibilities between MTC and MML used to be ambiguous and not well coordinated.

6.5 However, there are recent positive developments. An agreement on institutional cooperation mechanisms between MTC and MML was concluded in May 2015, and long-term sustainability may result from, successful implementation of this mechanism. MTC mentioned that it is currently examining the feasibility of establishing a Metropolitan Transport Authority to oversee the development of transport system in Lima, which would improve institutional arrangements and strengthen integrated urban transport system. This conceptually sound idea will require strong, consistent and sustained political commitments from both MML and MTC as well as understanding from implementing agencies. Detailed plans for integrating the fare collection system have yet to be finalized, but a study on this subject was conducted in 2014, and a working group consisted of key agencies, including MTC, MML and Protransporte, continues to discuss technical and financial aspects of tariff integration with the support from the World Bank. These are positive steps toward integrated urban transport system, but political commitments from all concerned parties are indispensable to make it happen.

## **BANK PERFORMANCE**

6.6 *Quality at entry is rated Unsatisfactory.* The project took more than seven years to prepare. In spite of this lengthy preparation time, several issues remained after effectiveness, relating to the realism of cost estimates, identification of risks, and feasibility of the implementation schedule. Project cost estimates were based on pre-feasibility study levels, and were not revised, so that actual values were nearly twice the appraisal estimates. The studies conducted during preparation did not sufficiently consider coordination issues with public utility services, such as electricity. Risks associated with private concessions were not spelled out clearly, which made it difficult to have a sound risk allocation between the public and private sides of the partnership. Harmonization of procurement guidelines between the Bank and IDB was not taken up seriously at the design stage, which led to difficulties and delays at the bidding stage. Loan effectiveness was delayed, partly for the above reasons.

6.7 The institutional capacity needed to execute a project of this complexity was underestimated, and the limited experience of Protransporte staff in this regard was not sufficiently taken into account. The steep learning curve faced by the high turnover of the implementing staff added to the delay in implementation during the initial years. The consequences of the fact that the Borrower did not own the lands earmarked for the construction of two planned transfer terminals and yards were not foreseen. The process of land purchase delayed construction of transfer terminals and yards to the last two years prior to project completion. The cost and efforts required for pre-operation were not adequately taken into account at design.

6.8 A further design weakness related to environmental and social safeguard policies. An Inspection Panel investigation was triggered by a complaint from residents of the Barranco locality of Lima, claiming insufficient attention to negative impacts on quality of life in the project. This could have been avoided by more careful preparation. Ultimately, the Bank took steps to address the concerns of the residents and the Inspection Panel.

6.9 The utilization scenario for Metropolitan BRT was optimistic in assuming that passengers per weekday would reach 600,000 soon after the project completion. Despite the fact that capacity reaches its limit in peak-hours, this target is yet to be reached even five years after Metropolitan BRT commenced operations. With respect to non-motorized transport, represented by the use of bicycles, insufficient attention was paid to supporting factors, such as safe parking space, raising drivers' awareness for sharing the road with bicycles, and broader cultural attitudes toward bicycle usage in society.

6.10 Project design nonetheless benefited from the lessons learnt from Bogotá's TransMilenio BRT system. These lessons related to hard infrastructure design, regulation and implementation aspects, such as traffic signage and regulation as well as automated fare collection and monitoring systems.

6.11 The design and preparation of the GEF grant drew on the technical background analyses partially financed through a Project Development and Preparation Facility Grant. A large number of participatory events helped outline and fine-tune the design, prepare terms of reference and technical specifications, and disseminate information relating to the planned activities under the GEF grant. However, the identification of most new bikeways was left to the Bicycle Master Plan and other studies developed under the project, thus pushing the construction of new bikeways towards the end of the project, leaving insufficient time for their promotion.

6.12 *The Bank's quality of supervision during the project is rated Moderately Satisfactory.* The intensity of Bank supervision in terms of staff weeks was relatively low in the first few years of project implementation, but picked up pace thereafter. The task team identified implementation problems such as high turnover of upper management in Protransporte and the lack of results on the ground. The team focused on institutional and procurement issues and was proactive in finding ways to accelerate project implementation. However, during the initial years of implementation, supervision in the areas of environmental and social management was inadequate.

6.13 Supervision of the Metropolitan's operations was also focused on traffic safety matters and pre-operation of the system. For example, the Bank, together with local staff, carried out station-by-station analyses of pedestrian and vehicle traffic safety. To further strengthen the supervision in this area, the Bank hired an international urban road safety expert, whose plan of actions and recommendations were taken on board by Protransporte.

6.14 The Bank supervision teams did not regularly include environmental and safeguard specialists until late 2007, impairing its ability to identify problems with environmental and social issues early in implementation. However, supervision relating

to safeguards was substantially strengthened following the problems identified in 2009 in response to complaints from residents of District of Barranco and the subsequent Inspection Panel investigation (see section on ‘safeguards’ paras 2.22-2.26). A number of actions were taken, including contracting a traffic specialist and proposing a new traffic management study. The Inspection Panel found that this was in compliance with OP 13.05 on Project Supervision, which requires Bank staff “to identify problems promptly as they arise and to recommend ways to solve them, as well as to recommend changes in the project concept as appropriate as the project evolves”. The project team worked proactively in preparing and focusing on the Management’s Plan of Action in response to the Inspection Panel report.

6.15 Supervision of the GEF grant was carried out twice a year by appropriately staffed teams. In addition to the regular supervision missions, the Bank team followed up on commitments through monthly conference calls documented in detailed minutes. When in Lima, the Bank team met with different local stakeholders to promote ownership of project activities and products after grant closure. It would have been beneficial to have prepared environmental guidelines for civil works to facilitate bicycle traffic, even though there was no formal requirement to do so.

Overall Bank Performance is rated *Moderately Satisfactory*.

#### **BORROWER PERFORMANCE**

6.16 *The Borrower’s performance is rated Moderately Unsatisfactory.* The Borrower was the Metropolitan Municipality of Lima (MML), with the loan being guaranteed by the Government of Peru. MML demonstrated leadership and commitment to the project during pre-operation and project implementation. It allocated budget resources for communication campaigns to the public and bus operators who would be impacted by the construction of the BRT. During the construction phase, MML made significant contributions to the resources needed for project implementation, and raised its local counterpart contribution from US\$44.4 million to US\$171.9 million to meet the escalation in costs.

6.17 However, during the first years of project execution, frequent changes were made in the top management and senior staff in Protransporte. While these changes may have been necessitated by weak performance and slow disbursements, they added to implementation delays.

6.18 MML worked on establishing the regulatory framework for the BRT system, but it was poorly designed and not enforced evenly. A case in point is the municipality ordinance (Ordenanza No. 682) of 2004, which disallowed other public transport services within 400 meters on either side of the BRT corridor. The design of this ordinance did not take sufficient account of the need of many citizens, particularly the poor and the very poor, to rely on traditional urban transport modes, which are both cheaper and more flexible. The ordinance has not been enforced. With regard to other regulations, the Urban Transport Bureau (*Gerencia de Transporte Urbano*, GTU) has recently made efforts to optimize bus routes and regulate informal taxi drivers. The national bicycle law

was passed, although, as noted earlier, it has not been seriously enforced, and there has been a lack of accompanying measures to encourage bicycle use.

6.19 While there is a plan to extend Metropolitan network to the north by 10.8 kilometers, coordination between MML and central government was not always smooth in the past. Even though the north extension was considered as an integral part of the concession agreement with private operators, the limited fiscal space in MML required funding support from the central government. The discussions have been taking place for a long time, but the previous administration of MML did not consider the plan seriously. The political leaders in Peru, including MTC, were also keen to develop the metro network.

6.20 However, the political and institutional situation shows sign of improvement. According to the MTC, an agreement was signed in May 2015 to establish cooperation mechanisms between MTC and MML for the development of mass transit systems in Lima. Under the agreement, the northern extension plan is being actively discussed by the current administration, and the integration of Metropolitan with metro and other transport system is also being studied.

6.21 MML provided adequate financing for the entity in charge of non-motorized transport (*Gerencia de Transporte no Motorizado*, GTNM), which maintained and extended the existing bikeway network, and promoted separate non-motorized transport initiatives. However, the municipalities benefitting from the project tended to favor motorized transport over non-motorized transport when it came to allocating scarce road space for bikeway construction. Although they generally supported bikeway construction, the municipalities did not always make sufficient efforts to keep parked cars off the bikeways. A few district municipalities in Lima delayed authorizations for bikeway works or changed their minds when the bikeway design was ready to be implemented. The Provincial Municipality of Callao strongly supported the bicycle promotion activities throughout project implementation, but invested less in non-motorized transport than it had originally committed to. This delayed the approval and completion of GEF-financed bikeways in Callao.

6.22 MML changed its mind several times on how to proceed with the scrapping of old buses, thus delaying project implementation. Moreover, during the implementation of the Study for the Consolidation of the Integrated Public Transport System in Metropolitan Lima, some of the issues did not receive immediate attention at the highest level.

6.23 ***Implementing agency performance during the project is rated Moderately Satisfactory.*** The MML initially delegated project implementation to a Project Implementation Unit (PIU), which later turned into an executing agency called Protransporte. During the first three years of project implementation, Protransporte experienced difficulties in achieving the results due to its lack of experience in managing BRT projects, including procurement, in accordance with the requirements of international financial institutions. The high turnover of key staff hurt the agency's implementation capacity; in 2006, more than 50 staff members were changed, thus delaying project implementation. During this period, the project was considered to be at risk.

6.24 However, since 2007 with a new board of directors and upper management staff, Protransporte demonstrated improved implementation capacity. It carried out the large and complex civil works, bus-concession and fare collection bidding processes. It assisted the bus concessionaires assisting in obtaining a line of credit from a Peru's national development bank (COFIDE). For these tasks it coordinated effectively with the Urban Transport Bureau (GTU) in charge of administering and supervising the concessions of transport routes and taxis, and the Lima Municipal Enterprise for Fare Management (Empresa Municipal Administradora de Peaje de Lima, EMAPE).

6.25 In addition to Protransporte, MML established a dedicated unit for non-motorized transport (GTNM). While its budget was limited, GTNM actively engaged with civil society and educational institutions to promote awareness of bicycle use. This institutional set-up demonstrated the strong support by the MML, but tensions between FONAM (*Fondo Nacional del Ambiente* – National Environmental Fund) and MML during project implementation suggested that implementation arrangements could have been streamlined if MML had taken this issue more seriously at the design stage.

6.26 Although both FONAM and GTNM suffered from weak institutional, technical and managerial capacity during project preparation, they grew considerably over the lifetime of the project. The commitment of the project staff in both institutions and the strong personality of the project coordinator became key assets. Nevertheless, insufficient attention was paid by both institutions to environmental and social safeguard issues. An environmental impact assessment was not prepared for the bicycle lane constructions. Protransporte took a rather reactive approach for the safeguard issues in Barranco. Protransporte's unit for overseeing environmental and social safeguards has not been functional since the main work of the Metropolitano was completed, and would need to be revived were the northern extension plan to be implemented. Lessons from the Barranco experience need to be absorbed.

6.27 Implementing the Study for the Consolidation of the Integrated Public Transport System in Metropolitan Lima was satisfactory conducted under GEF-funded portion through restructuring, despite some delays in making decisions and reviewing the respective deliverables. The study did not result in an east-west BRT corridor, but it was utilized in preparation for the Metro Line 2 project.

Overall, Borrower Performance is rated *Moderately Satisfactory*.

## MONITORING AND EVALUATION

6.28 **Monitoring & Evaluation Design.** The project's indicators were appropriately linked with outputs and intermediate outcomes (efficiency, reliability, clean and safe transport; and usage by low-income residents) in the project's results framework and measurable targets. The "efficient" and "reliable" aspects required more clarity, but the indicators included well-defined measurements for "cleaner" and "safer" mass rapid transit system. The key performance indicators for the intermediate objectives were: (i) reduced travel times in the project traffic corridor; (ii) reduction of fatal and serious accidents; (iii) reduction in air pollution emissions from the transport sector in the main trunk corridor; and (iv) increased percentage of users satisfied with the current transport

service; (v) percentage of low-income population benefited from the project. User satisfaction rate and proportion of beneficiaries coming from low-income population were appropriate to understand the quality of service delivery and access to the poor in per-urban areas.

6.29 However, there were no explicit indicators for enhancing economic productivity and quality of life. Metropolitan users accounted for only a small percentage (1.74 percent) of the population in LMR, and it was difficult, though not impossible, to observe the impact attributable to the project for this higher-level objective without clear definition and measurements. The M&E framework did not have appropriate outcome indicators for accessibility, which was critical for the project. The baseline data was not collected at design, and the project team subsequently clarified that, despite the project's long preparation time, baseline data had not been collected during preparation as a result of financial and human-resource constraints.

6.30 The indicators linked with GEF-funded portion were mostly output-based, such as number of concessionaires of the high-capacity segregated busway system that were offered buses for scrapping; number of aged and polluting public transport vehicles retired through Protransporte's own scrapping scheme; kilometers of bikeway rehabilitation and extension, etc. Only one indicator directly measured the modal shift toward non-motorized transport, i.e., percentage increase in number of bicycle trips in the project financed bikeway in comparison to the baseline.

6.31 **M&E Implementation.** The Borrower and the Bank team collected output indicators on a regular basis. Protransporte has a unit to collect and analyze project performance indicators. During the first year of project implementation in 2004, an urban transport master plan funded by JICA was prepared, and comprehensive urban traffic data in LMR was collected to set-out baseline values for respective indicators. The Bank team utilized this information for its Mid-Term Review in 2006.

6.32 Operational data was also collected through the central control system. All Metropolitan users have to use a special card for entry, and through the card information, Protransporte and the fare collection company could monitor and analyze travel patterns and statistics on a daily basis.

6.33 Protransporte conducts user satisfaction surveys on an annual basis. A civil service organization, Lima Cómo Vamos (“How Goes Lima”), has been conducting annual household surveys since 2010 to assess the quality of life in LMR, and short user-satisfaction survey with urban transport modes is included as one of the main items of its questionnaire. Apart from providing detailed information on various characteristics and perceptions of ridership, the availability of two sources of information that are independent of each other is valuable for drawing more objective conclusions.

6.34 Regarding the GEF-funded portion, data were regularly collected and presented during supervision missions. Periodic M&E reports were prepared. Bicycle counts and bicycle-use surveys were conducted at approximately two-yearly intervals due to the high cost and taking into account the progress in bicycle infrastructure provision and bicycle promotion activities.

6.35 **M&E Utilization.** The M&E system was used for making managerial decisions during the implementation of the project. For instance, the mobility data was utilized to develop super express, express and all stations bus lines to reduce travel time and congestion. Feedback from FONAM suggests that information collected during project implementation was used to improve bicycle promotion strategy and activities.

Overall, M&E is rated *Substantial*.

## 7. Lessons

- **Improving mobility and accessibility for the poor through Bus Rapid Transit systems requires integrating the main corridor effectively with feeder services and other public transport system that reach close to the traveler's origins and destinations.** While the Metropolitano BRT was able to provide mobility to a significant number of poor residents, it is not likely to reach its potential for serving this population segment without extensive penetration of feeder routes with multiple modes, to their work, school, hospital and residential locations.
- **Realistic scenarios and sound risk allocation are crucial for public-private partnerships if high service standards are to be maintained and the use of the assets providing the service is to be maximized.** In this project, the private bus operator concessions did not include a minimum revenue guarantee from the Metropolitan Municipality of Lima (MML). The number of passengers was below the target at project completion even after five years of operation, and the situation was particularly serious in the initial operating stage. To close the gap between the planned and actual scenarios, analysis for competition with other transport modes, enforcement of a sound regulatory framework and communication to citizens needed to be strengthened.
- **Given the complex urban settings in which rapid urban transport systems are typically situated, it is important to inform and consult with all categories of project affected persons, to anticipate and take effective measures to prevent possible negative environmental and social impacts and related disputes.** In this project, insufficient information was provided to residents of a locality that was eventually impacted by re-routing of traffic from the project, resulting in a complaint and an Inspection Panel investigation, which contributed to delays in project implementation.
- **A shift towards non-motorized transport can be expected to take a long time even with enabling and supporting factors and facilities in place.** The experience with promoting bicycle usage in the LMR demonstrates the slow pace at which non-motorized transport is adopted. The bikeway infrastructure development and awareness raising campaigns could be necessary conditions, but they are not sufficient. In this case, this transformation was delayed further by insufficient attention to other supporting factors, such as safe parking space and raising drivers' awareness of the need to share the road with bicycles. More broadly, the prevailing cultural attitudes toward using bicycle should be taken into account.

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## Annex A. Basic Data Sheet

### LIMA TRANSPORT PROJECT (IBRD-72090 TF-52877 TF-52856)

#### Key Project Data (amounts in US\$ million)

	Appraisal estimate	Actual or current estimate	Actual as % of appraisal estimate
Total project costs	134.4	261.9	195.4%
Loan amount	45.0	45.0	100%
Co-financing	45.0	45.0	100%
Cancellation	-	-	-

#### Cumulative Estimated and Actual Disbursements (P035740)

	<i>FY04</i>	<i>FY05</i>	<i>FY06</i>	<i>FY07</i>	<i>FY08</i>	<i>FY09</i>	<i>FY10</i>	<i>FY11</i>
Appraisal estimate (US\$M) <sup>a</sup>	2.2	13.2	27.1	40.5	45.0	45.0	45.0	45.0
Actual (US\$M) <sup>b</sup>	0.0	2.4	1.8	5.4	13.7	32.4	42.5	45.0
Actual as % of appraisal	0	17.8	6.7	13.2	30.5	72.1	94.5	100
Date of last disbursement: May 2, 2011								

a. Appraisal estimate (cumulative) are taken from the Project Appraisal Document.

b. Actual disbursements (cumulative) are based on “Disbursement Schedule” in SAP system.

#### Cumulative Estimated and Actual Disbursements (P074021)

	<i>FY04</i>	<i>FY05</i>	<i>FY06</i>	<i>FY07</i>	<i>FY08</i>	<i>FY09</i>	<i>FY10</i>	<i>FY11</i>
Appraisal estimate (US\$M) <sup>a</sup>	3.2	5.7	7.2	7.7	7.9	7.9	7.9	7.9
Actual (US\$M) <sup>b</sup>	-	0.7	1.9	3.2	4.0	5.1	7.3	7.4
Actual as % of appraisal	0	12.7	26.5	40.9	50.4	64.2	91.5	92.7
Date of last disbursement: August 20, 2010								

*Note:* In addition to US\$7.93 million support through TF-52856, the Japan Social Development Fund (JSDF) provided US\$1.145 million support through TF-52877 for the GEF-funded project.

a. Appraisal estimate (cumulative) are taken from the Project Appraisal Document.

b. Actual disbursements (cumulative) are based on “Disbursement Schedule” in SAP system.

#### Project Dates (P035740)

	Original	Actual
Appraisal	06/24/2003	06/24/2003
Board approval	12/09/2003	12/09/2003
Effectiveness	12/15/2004	12/15/2004
Closing date	06/30/2009	04/30/2011

**Project Dates (P074021)**

	Original	Actual
Appraisal	06/24/2003	06/24/2003
Board approval	12/09/2003	12/09/2003
Effectiveness	12/15/2004	08/31/2004
Closing date	06/30/2009	06/30/2010

**Staff Time and Cost**

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
<b>Lending</b>		
FY01	7.11	39,081.47
FY02	15.01	70,026.34
FY03	16.46	74,436.29
FY04	8.44	36,074.95
<b>Total:</b>	<b>47.02</b>	<b>219,619.05</b>
<b>Supervision/ICR</b>		
FY04	5.83	35,200.28
FY05	8.57	47,378.19
FY06	7.68	52,300.16
FY07	20.28	80,327.64
FY08	16.24	58,641.20
FY09	11.46	48,999.98
FY10	12.16	9,252.42
FY11	4.10	13,151.69
FY12	17.00	76,000.00
<b>Total:</b>	<b>103.32</b>	<b>461,251.56</b>

**Task Team Members**

<b>Names</b>	<b>Title</b>	<b>Unit</b>	<b>Responsibility</b>
<b>Lending</b>			
Andrés Pacheco	Consultant	LCSTR	Transport
Gerhard Menckhoff	Consultant	LCSTR	Urban Transport
Judy L. Baker	Lead Economist	FEUUR	Poverty
Keisner De Jesus Alfaro	Sr. Procurement Specialist	LCSPT	Procurement
Kirsten L. Oleson	Consultant	LCSEG	Consultant
Mark Delucchi	Urban Transport Consultant	LCSEN	Urban Transport
Oswaldo Patiño	Institutional Consultant	LCSTR	Economist
Patricia McKenzie	Institutional Consultant	MNAFM	Financial Management
Paul Procee	Sr. Infrastructure Specialist	EASCS	Environment
Paulus A. Guitink	Consultant	AFTR	Transport
Pierre Graftieaux	Sr. Transport Specialist	AFTR	Transport
Pierre Werbrouck	Consultant	LCSAR	Consultant
Sophie Sirtaine	Sector Manager	ECSF2	Sector Manager
Walter Vergara	Lead Chemical Engineer	ENV	Environment
<b>Supervision/ICR</b>			
Alonso Zarzar Casis	Sr. Social Scientist	LCSSO	Social
Ana Lucia Jimenez Nieto	Financial Management Specialist	LCSFM	Financial Mgt.
Andrés Pacheco	Consultant	LCSTR	Transport
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Elisabeth Goller	Sr. Transport. Spec.	LCSTR	Transport
Qays Hamad	Sr. Operation Officer	OPCS	Operations
Enrique Millones	Consultant		Environment
Oswaldo Patino	Institutional Consultant		Economist
Evelyn Villatoro	Sr. Procurement Specialist	EAPPR	Procurement
Francisco Rodriguez	Procurement Specialist	LCSPT	Procurement
Gabriela Arcos	Environmental Spec.	LCSEN	Environment
Gerhard Menckhoff	Consultant	LCSTR	Urban Transport Specialist
Harvey Manuel Scorcia	Junior Professional Associate	LCSTR	Transport
Jean-Jacques Verdeaux	Sr. Procurement Specialist	LCSPT	Procurement
Keisgner De Jesus Alfaro	Sr. Procurement Specialist	LCSPT	Procurement
Luis M. Schwarz	Sr. Finance Officer	CTRFC	Financial Mgt.
María Catalina Ochoa	Junior Professional Associate	LCSTR	Transport
María Elizabeth Dasso	Sr. Social Development & Civil	LCSSO	Social
María Lucy Giraldo	Senior Procurement Specialist	LCSPT	Procurement
Michael J. Goldberg	Sr. Private Sector Devt. Spec.	LCSPF	PrivateSector
Miriam Cespedes	Program Assistant	LCSPT	Program Assistant
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Nicolas Francisco Estupinan	Junior Professional Associate	LCSTR	Transport
Oswaldo Patiño	Consultant	AFTR	
Patricia McKenzie	Manager Financial Management	MNAFM	Financial Mgt.
Paul Procee	Sr. Infrastructure Specialist	EASCS	Environment
Paulus A. Guitink	Consultant	AFTR	Transport
Pierre Graftieaux	Sr. Transport Specialist	AFTR	Transport
Pierre Werbrouck	Consultant	LCSAR	Consultant
Raul Tolmos	E T Consultant	LCSEN	Environment

<b>Names</b>	<b>Title</b>	<b>Unit</b>	<b>Responsibility</b>
Tomas Socias	Sr. Procurement Spec.	OPCPR	Procurement
Sandra Arzubiaga	Communications Officer	LCREA	Communications
Xiomara A. Morel	Sr. Financial Mgmt. Specialist	LCSFM	Financial Mgt.

## Annex B. List of WB Urban Transport Projects in Peru

**Table 1. World Bank Lending for Transport sector in Peru (1994-Present)**

No.	Project ID	Name	Approval FY	Closing FY	Instrument	Project Cost (US\$M)	WB Commitment (US\$M)
1	P008045	Transport Rehabilitation	1994	2000	Specific Inv./Maint Loan	256	150
2	P035740	PE Lima Transport Project	2004	2011	Specific Investment Loan	134	45
3	P037047	Rural Road Rehabilitation & Maintenance	1996	2001	Specific Inv./Maint Loan	250	90
4	P044601	PE Second Rural Road Project	2001	2007	Specific Inv./Maint Loan	151	50
5	P074021	PE GEF Lima Transport Project	2004	2010	Specific Investment Loan	8	8
6	P078813	PE Regional Transport Decentralization	2006	2014	Specific Investment Loan	200	50
7	P095570	PE Decentralized Rural Transport Project	2007	2014	Specific Investment Loan	150	50
8	P116929	PE Safe and Sustainable Transport	2010	2015	Specific Inv./Maint Loan	540	150
9	P129561	PE Universal Mobility in Lima	2012	2016	Technical Assistant Loan	3	3
10	P132505	PE Cusco Transport Improvement	2014	2019	IPF	153	120



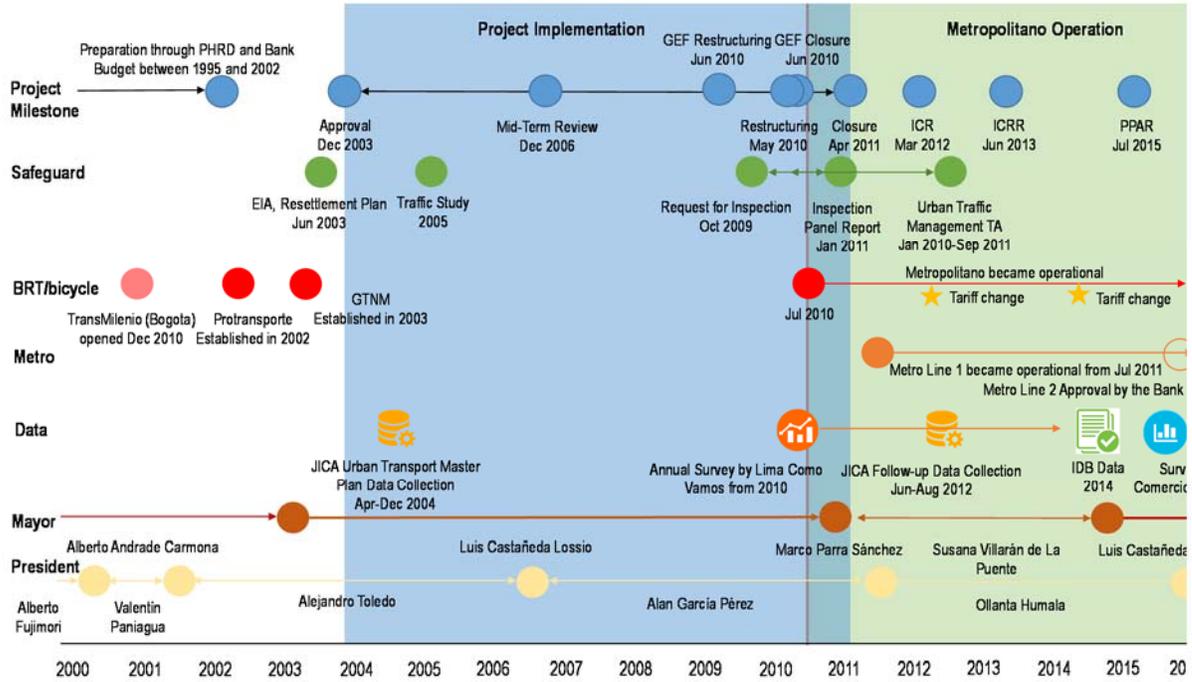
**Table 2: List of World Bank BRT Projects Since Fiscal Year 2002**

No	Country	Project Name	Year	Commit	Funding
1	Nigeria	Lagos Urban Transport Project	2003	100	IDA
2	Mexico	Introduction of Climate Friendly Measures in Transport	2003	6	GEF
3	Chile	Sustainable Transport & Air Quality for Santiago	2004	7	GEF
4	Peru	Lima Transport Project	2004	45	IBRD
5	Chile	Santiago Urban Transport Development Policy Loan	2006	30	IBRD
6	Colombia	Bogotá Urban Services Project	2003	100	IBRD
7	Colombia	Integrated Mass Transit Systems Project	2004	250	IBRD
8	Ghana	Urban Transport Project	2007	45	IDA
9	Tanzania	Second Central Transport Corridor Project	2008	190	IDA
10	China	Urban Transport Partnership Program Project	2008	21	GEF
11	Viet Nam	Hanoi Urban Transport	2008	155.21	IDA
12	China	Xi'an Sustainable Urban Transport Project	2008	150	IBRD
13	Bangladesh	Clean Air and Sustainable Environment Project	2009	62.2	IDA
14	Ghana	Transport Sector Project	2009	225	IDA
15	India	Sustainable Urban Transport Project	2010	105.23	IBRD
16	Nigeria	Lagos Urban Transport Project 2	2010	190	IDA
17	Senegal	Transport and Urban Mobility Project	2010	55	IDA
18	Uganda	Transport Sector Development Project	2010	190	IDA
19	Mexico	Sustainable Transport and Air Quality Project	2010	5	GEF
20	China	Taiyuan Urban Transport Project	2010	150	IBRD
21	Argentina	Urban Transport in Metropolitan Areas	2010	150	IBRD
22	Mexico	Urban Transport Transformation Project	2010	150	IBRD
23	China	Wuhan Second Urban Transport Project	2010	100	IBRD
24	Viet Nam	Danang Sustainable City Development Project	2013	272.2	IDA
25	Philippines	Cebu Bus Rapid Transit (BRT) Project	2015	116	IBRD

Source: IEG.

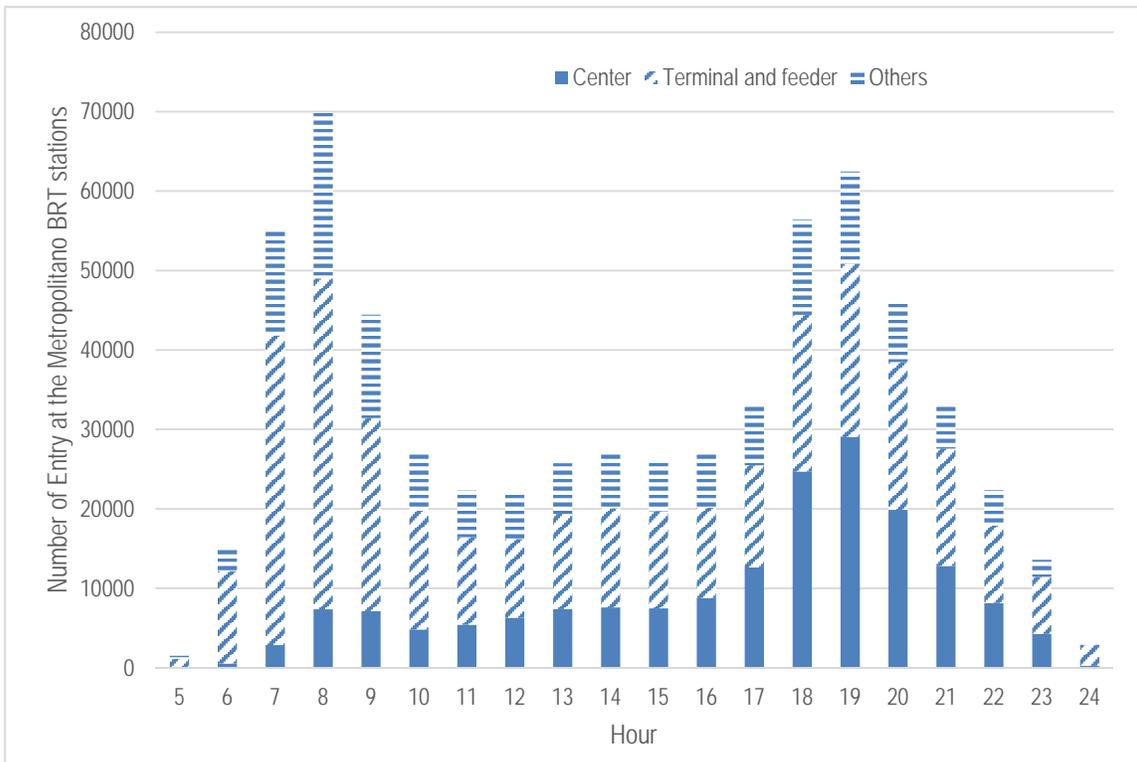
Note: IFC supports another BRT project in Guatemala

Figure 2: Key Project Milestones



Source: IEG.

Figure 3: Number of Entry at the Metropolitan BRT Stations by Hour of the Day



Source: IEG using data from Protransporte

Notes: The data covers all the entry to the Metropolitan BRT station on June 22 (Monday), 2015, which is first working day during the PPAR mission in Peru (similar traffic pattern was observed for the rest of the weekday for the week of June 15, 2015). The entry information is recorded through Metropolitan card which every passenger has to use it to get on the Metropolitan bus. The data identifies the time of entry and entry station (though no information available for exit station), and "Terminal and feeder" includes entry information for Naranjal (north terminal), Matellini (south terminal) and all feeder route bus entry information. The "Center" means central part of Lima, which is defined as the Metropolitan stations between "28 de Julio" and "Jiron de la Union". All other Metropolitan bus stations are categorized as "Others". The Metropolitan cards which has more than 20 transactions per day are considered as outliers and dropped. While there is no information available for exit stations per trip, large proportion of people using "Terminal and feeder" buses in the morning peak-hour as well as "Central" buses in the evening peak-hour suggests that people use Metropolitan to commute for job and schools which are mainly located in the central part of Lima. However, interpretation of this graph needs to be careful because both transactions are recorded in one trip for those who use trunk route and feeder route, and certain proportion of "Terminal and feeder" users are likely to be double counted in this graph.

**Figure 4. Metropolitan Users and All Transport Users by Monthly Income Level**



Source: IEG using data from JICA (2013)

Notes: If the household includes at least one Metropolitan users, such household is defined as "Metropolitano users" (sample size is 1,010 households). "Others" did not include any household members who use Metropolitan as primary means of transportation (sample size is 20,686 households). The households who could not answer this question were excluded (sample size is 1,007).

## **Annex D. List of Persons Met**

### **Metropolitan Municipality of Lima**

*Ms. Jenny Samanez Gonzáles Vigil*, Sub-Gerente de Transporte no Motorizado

#### **Protransporte**

*Ms. Víctor Pacahuala Velásquez*, Presidente, Presidencia de Directorio

*Mr. Jaime Romero Bonilla*, Gerente Gerencia General

*Mr. Tulio Gálvez Escudero*, Gerente, Gerencia de Operaciones

#### **FONAM**

*Ms. Julia Justo Soto*, Directora Ejecutiva

*Ms. Inés Mendoza Cámac*, Coordinator, Area of Climate Change and Promotion of Carbon Market

#### **Private Operators**

*Mr. Ralph Pollandt*, ACS Solutions Peru, S.A

*Mr. José Luis Díaz León*, Gerente General, Lima Bus International 1 S.A.

*Mr. John Fredy Domínguez*, Gerente de Operaciones, Lima Bus International 1 S.A.

*Mr. Otto Augusto Sarmiento*, Gerente General, Lima Vías Express S.A.

#### **Civil Society / Disabled People**

*Ms. Gladis Macizo Gomez*, Committee for Clean Air

*Ms. Mariana Alegre Escorza*, Coordinadora General, Lima Cómo Vamos

*Mr. Juanjo Arrué*, Coordinador de Proyectos Perú y Latinoamérica, Community Design Group

*Mr. Arq. Jaime Huerta Peralta*, Coordinador de Panel de Expertos

*Ms. Barbara Ventura*, Especialista en Comunicaciones

*Mr. Luis Miguel del Aguila*, Especialista Social

*Ms. Angela Marin*, Especialista en Interpretación

#### **JICA**

*Mr. Makoto Kanagawa*, Sectorista Senior

*Mr. Tatsuro Iwahashi*, Sectorista Senior

#### **IDB**

*Ms. Lynn Scholl*, Economics Specialist, Office of Evaluation and Oversight

#### **World Bank**

*Mr. Alberto Rodríguez*, Country Director, World Bank

*Mr. Arturo Ardila Gomez*, Lead Transport Economist and Task Team Leader, World Bank

*Mr. Georges Bianco Darido*, Lead Transport Economist, World Bank

*Mr. Felipe Targa Rodriguez*, Senior Transport Economist, World Bank

*Mr. Oswaldo Patino*, Consultant, World Bank

*Mr. Gerhard Menckhoff*, World Bank (Retired)

Note: During project site visits, IEG mission members had conversations with several Metropolitano users. The conversations were facilitated through translators.