

At a Glance

Light Rail Transit Line 2 IMPACT EVALUATION

Economic Impact

1 Absence of LRT2 on its current route will make the R-6 corridor Manila's most congested road.



TO MEET THIS DEMAND, IT WILL TAKE ABOUT...



2 LRT2 generates expected impacts

▲ Reliably faster travel --- about **9 to 19 mins** faster across stations within the rail line.



▲ Significant travel time reduction for trips beyond east and west endpoints

The endpoints are important for most trips.



▲ More than **90%** of satisfied LRT2 riders enjoy these three key features

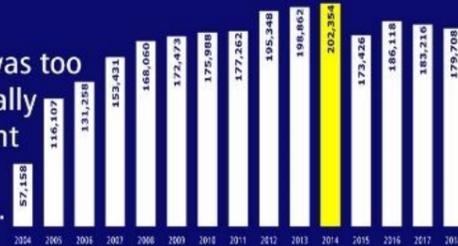


▲ LRT2 riding experience can be improved when technology-based features are introduced



▲ **PH P 92 MILLION** Estimated 2018 value of vehicle operating cost savings

3 Ridership projection was too optimistic that naturally resulted to non-attainment of the targeted **510,000** average daily passengers.



Highest LRT2 daily ridership attained was in 2014 at **202,354**

Construction and Implementation

4 **SIGNIFICANT IMPLEMENTATION DELAYS**
Planned 2001 operations for Santolan to Cubao moved to Q3 2003, and Cubao to Recto moved to 2004.

5 **Negative effects of project delays:**
- price escalations
- interest charges
- foreign exchange risks

6 **ROWA PROC.**
Right of Way Acquisition and Procurement are the biggest delay factors for the LRT2 project

Operations

7 **EIGHT** operational train sets **TEN** non-operational train sets

LRT2 was originally designed to operate on 18 train sets.

8 **SLOW PROCUREMENT PROCESS** for parts and components become a major constraint to maintenance and sustainability

9 **Fair Box ratio** is below **100%**
Rail revenues cannot cover operational expenses. This is still an effect of low daily ridership.

Main Recommendations

10 LRTA to expedite **EAST and WEST Expansion** to catalyze ridership growth and facilitate small entrepreneurs rail line from the Port Area / Divisoria to the rich and untapped commercial regions of Antipolo and Montalban.

11 LRTA to immediately address parts procurement issue by collaborating with DOST, DTI engineering universities and capable local fabricators to handle **spare parts localization**.

12 LRTA should proactively develop rail transit as core of an efficient integrated transport system closely linked to feeder modes in one to two years with serious consideration for Bus Rapid Transit.

SOURCES: EVALUATION TEAM, LRTA



Executive Summary

Project Background

The Light Rail Transit Line 2 (“LRT2”) Project is a 13.8-kilometer line with eleven (11) stations running in the east-west direction from Santolan, Pasig up to Claro M. Recto Avenue in Manila. It is connected to three (3) other lines: LRT Line 1 running north to south from Monumento to Baclaran; Mass Rapid Transit (MRT) Line 3 along Epifanio delos Santos Ave. (EDSA) from Taft Ave. to North Ave.; and Philippine National Railways (PNR) Metro Commuter Line from Tondo to southern and northern Metro Manila.

LRT2 was included in the National Medium-Term Development Plan 1993-1998 and regarded as one “flagship project”. It aims to provide an alternative transport system that is safe, comfortable, efficient and affordable – contributing to the overall transport sector goal of sustained public transport-based development. It became fully operational in the first quarter of year 2004, serving an average of close to 200,000 passengers daily.

Evaluation Objectives

This LRT2 Project impact evaluation study aimed to:

1. Ascertain whether the project appraisal assumptions were met and the intended project benefits were realized;
2. Provide lessons learned during project implementation and operation and maintenance; and
3. Capture any unintended benefits which can be attributable to the project.

The evaluation criteria included: (a) effectiveness; (b) efficiency; (c) impact; (d) sustainability; and (e) relevance.

The study was supported under the National Economic and Development Authority Monitoring and Evaluation (NEDA M&E) Fund. As NEDA plays a major role in monitoring and evaluating policies, major capital programs and projects, as well as government plans such as the Philippine Development Plan, the Fund finances M&E initiatives to gauge the success of development interventions, extract lessons from project/ program implementation, and enhance existing information technology applications and database management systems.

Evaluation Approaches

1. Theory of Change-Based Evaluation

The evaluation was designed based on the retrofitted Theory of Change (TOC), Updated Logical Framework and Evaluation Operational Framework. The TOC establishes how and why desired changes envisioned under the project are expected to happen based on a chain of events. Building on the TOC, the Log frame then specifies specific indicators against which impact is to be evaluated. Finally, the Operational Framework ties together the six (6) main evaluation questions and the Log frame indicators; and then matches said indicators with particular evaluation tools.

2. Integrated Transport System Approach

The essence of mass transport is seamless connectivity within the entirety of the transport system, which is understood to mean a multi-modal transport network where road, rail, water (ferry), and air (e.g., helicopter taxi) transport – including non-motorized (biking, walking) – are interconnected to efficiently convey passengers and cargo between/ across urban centers and suburban/ peri-urban areas. Different transport modes compete with, as well as complement, each other.

3. Baseline-Constrained Evaluation Approach

Baseline data were found available only for ridership, Vehicle Operating Cost (VOC) savings, travel time savings, trip length per rider, and output indicators. Given these limitations, the evaluation employed research strategies drawn from the M&E community of practice. The baseline-constrained evaluation approach, which might also be considered for future studies, includes (3) three equally important “baseline reconstruction strategies”: (a) recall; (b) mining secondary data in previous/ related studies; and (c) use of project management records.

Data Generation Methodologies

1. Socio-economic research

Household (HH) Survey

The random survey covered a total of 807 sample households in 41 barangays. One-half of the households reside in barangays located within a 1,000-meter radius from the LRT2 stations, referred to as “project impact area” or treatment sites. The other half live in comparable barangays outside the 1,000-meter radius, particularly along the Quezon Ave.-España Boulevard corridor (Radial Road 7 or R-7), referred to as “non-project area” or control sites.

Key Informant Interview (KII)

Interviews were conducted with project implementers in the Department of Transportation (DOTr), Light Rail Transit Authority (LRTA), Metropolitan Manila Development Authority (MMDA), NEDA, and Japan International Cooperation Agency (JICA). Similar KIIs were held with vendors and businesses operating proximate to the LRT2 stations. A total of 209 individuals were interviewed.

Focus Group Discussion (FGD)

Ten (10) sessions were completed – seven (7) within the project impact area (four (4) in influence areas + three (3) in outside influence areas), and three (3) in the non-project area. The aggregate number of participants was 140, comprised of representatives from various groups – barangay councils, women, youth, transport, traffic enforcers, vendors, students, and senior citizens. Barangay staff and officials constituted the majority (42%) of discussants.

2. Transport and origin-destination studies

Rail Rider Survey (RRS)

This random survey covered a sample of 128 respondents in each of the eleven (11) LRT2 per station, sub-divided between morning and afternoon peak and off-peak hours, at different days of the week. The number of interviewees reached a total of 1,591 riders. The questions focused on the respondents' travel time and costs incurred in traveling from their point of origin to their destination.

RRS Perception Survey

A perception survey on accessibility, environmental quality, and other LRT2 impacts was undertaken as a component of the RRS, to complement data on travel time and costs. The survey covered a total of 1,427 respondents, representing varied types of riders: male, female, including seniors and Person with Disabilities (PWDs), traveling at peak and off-peak hours, on different days of the week.

Traffic Count

This recorded the different transport modes plying the vicinity of LRT2 stations. It was done in two (2) areas: (i) Recto – Rizal Avenue (Avenida) intersection at the west end of LRT2 in Manila; and (ii) EDSA - Aurora Boulevard intersection in Quezon City. The count was designed to capture the morning and afternoon/ evening rush, as well as days of the week representing the normal high-volume and normal low-volume flow of vehicles.

Vehicle Operating Cost (VOC)

Motorists were interviewed to gather information on operating costs including fuel, oil, spare parts, maintenance, labor, and insurance. The vehicle types covered were private cars/ personal vehicles, public utility jeepney (PUJ), Utility Vehicle (UV) Express, and buses. Taxis were excluded because of cheaper alternatives; trucks because these do not compete with LRT2; and motorcycles because of safety issues.

Travel Time Simulation

Two (2) separate simulation exercises were conducted. One was a monitored ride on LRT2, taking note of the time consumed in accessing the train from the station's entrance until boarding; during the ride and until the intended station is reached; and in exiting the station. The other was a monitored ride using public transport other than LRT2, following a route competing with LRT2, and assuming a similar destination.

3. Supplemental Data Generation Methodologies

LRT2 Station Observation and Profiling

This sought to deepen understanding of the day-to-day train operations. It entailed a recording of observations regarding the conditions and attributes of each of the eleven (11) stations and its surroundings within a 200-meter radius from the station.

On-line survey in non-project area

This gathered additional information from 86 randomly selected commuters along the Quezon Ave.-España Boulevard corridor, as control site for the impact evaluation. The survey comprised sixteen (16) multiple choice questions.



Rapid E-Survey using LRT2 Station Wi-Fi

This was intended not only to generate supplemental perception data, but also to develop a low-cost data collection tool for LRTA to efficiently draw feedback from riders, as basis for addressing concerns to continually improve LRT2 services. The questionnaire can be completed while the rider waits for the train.

Data Analysis Methodologies

1. Quantitative Analysis

Single Difference Analysis/ Descriptive Statistics

This compares before and after conditions in the project (treatment) areas in order to discern changes that may be attributable to the project. “Contribution analysis” – which is a simpler version of attribution analysis – was then used to investigate project contributions to tangible changes in impact indicators.

Difference-in-Differences Analysis (DID)

DID, a counterfactual impact evaluation method, was used to estimate the net impact of the LRT2 Project, done by comparing the changes or differences in outcomes (such as reduction in travel time and costs) before and after LRT2; and similar outcomes in the non-project area. Here, attribution analysis rather than contribution analysis was applied to determine the project’s “net benefits”.

Propensity Score Matching (PSM)

PSM was applied to further enhance the comparability of the sample respondents in the project and non-project areas. This was done by matching these two (2) groups based on “propensity scores” which is the estimated probability of using the LRT2 – given some observable characteristic (such as distance from the LRT2 station, age, etc.) from a regression model of participation. PSM was used in combination with DID.

2. Qualitative Analysis

Case Studies

On-site interviews were conducted to deepen understanding of findings. The case studies are intended to bestow a human face to statistics and numbers. Case interviews were conducted with three (3) major groups of project-affected people: (i) those who were resettled; (ii) vendors in the vicinity of LRT2 stations; and (iii) jeepney drivers plying the LRT2 route.



Evaluation Results

This summary is organized according to the six (6) major evaluation questions.

Question #1: Was LRT2 Project implemented according to how it was originally planned?

MAJOR FINDINGS AND CONCLUSIONS

1. **Project period.** Implementation was significantly delayed. LRT2 was originally scheduled to operate first quarter of Year 2001. Santolan to Cubao services started third quarter 2003; Cubao to Recto, first quarter 2004. Delays are attributable to: (1) acquiring road right-of-way (RROW), which in turn required design changes; and (2) procurement. The same reasons are highlighted in the previous (2008/ 2009) Ex-Post Study, which counted a total delay of three (3) years and five (5) months. The delays exposed the project to higher prices and interest charges, exacerbated by foreign exchange fluctuations.
2. **Ridership projection.** The projected level of 510,000 daily was too optimistic. The previous Ex-Post Study noted the actual number of passengers to be one-third of planned. Actual levels range from 175,156 to 202,333 (2012-2017). The projection exceeds the full system capacity of 463,650 passengers derived in the course of the impact study (8 train sets multiplied by 282 daily trips). It will not be fair to declare that LRT2 is underperforming based on ridership projection alone. The ridership projection also drove VOC savings, time savings, and other targets to correspondingly high levels. In the 1990s, similarly high projections were being made in the United States until a landmark study of 19 projects conducted by a transport economist, Don H. Pickrell, created the “Pickrell effect” of improving forecasts.
3. **Rolling stocks.** At the time of the previous Ex-Post Study, 14 out of the 18 train sets were operational. Now, only eight (8) are running. Delays in procurement of spare parts translate to lower operating capacity. The engineering and maintenance group of LRTA can only resort to usable parts from other non-operating trains. Rolling stocks across urban rails vary in specifications, and there is no chance of parts interchangeability, which was one of the recommendations in the previous Ex-Post Study.
4. **Route selection.** Compared to two (2) other options, the current Aurora Route is the best choice since it traverses Radial Road 6 (R-6), a high-volume corridor with numerous traffic generators – a major requirement for mass transit to be sustainable.
5. **Weak links.** At its midpoint, R-6 has low density communities spanning an area of more than three (3) kilometers in diameter. That these communities do not need public transport is reflected by the consistently low ridership at midpoint stations: Betty Go-Belmonte, Gilmore, and J. Ruiz. Mass transit must serve a high-density corridor to survive; density is measurable using Percent of People Near Transit (PNT).
6. **Market potentials.** The failure to build the rail line up to Tutuban in Divisoria reduced ridership by an estimated 14%. Servicing Tutuban could have involved a commercial section in the trainset; and multiply socio-economic impact by applying the Small Entrepreneurs Rail Line Concept.
7. **Feeder transport.** This is any form of motorized or non-motorized vehicle bringing passengers (rail riders) to any station. PUJs serve as major feeder, followed by tricycles and motorcycle



taxi. The volume of feeder transport increased after LRT2 commenced operations. However, not all stations have a feeder terminal/ hub vital to promoting the road-to-rail shift.

8. **Physical outputs.** (a) Depot – 1.24 ha. area completed compared to targeted 9.8 ha., due to unsuccessful land negotiation. (b) Viaduct and track works – 13.8 km. completed as planned. (c) Stations – eleven (11) fully operational. (d) Train sets – 8 out of 18 operating. (e) Maintenance policies – functional. (f) Maintenance facilities – with sufficient capacity to serve trains.

MAIN RECOMMENDATIONS

1. **Route enhancements.** To boost ridership, LRTA should expedite operation of the Masinag extension (within 2019) to open up a new market in terms of growing settlements in eastern Metro Manila. At the west end, LRTA should expedite the Tutuban extension (next three years), and up to Port Area (next six years) – thereby putting in place the R-6 Small Entrepreneurs Rail Line anchored to Divisoria.
2. **Spare parts procurement.** DOTr should delegate procurement to LRTA (starting 2019) as the agency accountable for efficient operation of all rolling stocks. LRTA should consider three (3) options, individually or in combination: (i) include parts in a 20 to 30-year agreement with train supplier; (ii) include parts as an obligation of the local train supplier partner; and (iii) support research and development and local manufacture.
3. **Filling facility gaps.** LRTA should build major transport hubs in both east and west endpoints in support of a more efficient feeder transport system (next one to two years). By including park and ride facilities, the road-to-rail shift will be accelerated. Financing of the facilities need not come from government; income potentials from transport hub operations are sufficient to attract investors.
4. **Rail master plan.** Beyond extension lines and transport hubs, LRTA should program investments based on a comprehensive, multi-year plan as general reference integrating socio-economic, environmental, and land use and zoning considerations (next two years). The plan will guide private initiatives to complement public infrastructure. The plan can provide the basis for a “plan-based RROW acquisition approach” to preempt costly delays in implementation.
5. **IEC campaign.** LRTA should develop an information and education campaign including a passenger interaction system to promote the use of rail via on-line facility (within 2019). Although a mobile information infrastructure is in place, LRTA needs to further innovate on tech applications. Linked to this could be a comprehensive rebranding of LRT2 (next year 2020).
6. **Others recommendations.** (a) LRTA should commission an in-depth study focusing at the midpoint of the LRT2 route, to better understand factors resulting to low ridership other than low population density (within 2019). (b) Government as a whole should invest on knowledgeable, incorruptible, and technically trained leaders to manage city region planning and implementation (next two years).

Question #2: Is the project being operated according to how it was intended?

MAJOR FINDINGS AND CONCLUSIONS

1. **LRT2 efficiency.** The “tipping point” for LRT ridership is shorter travel time. Majority of riders (81%) ranked comfort, accessibility, affordability, and safety after travel time, with a very wide margin.
2. **Queueing time.** As part of travel time, queue time on average is 2.1 minutes. **Queueing time can be further reduced through IT/ smartphone applications.** The average waiting time (for the train to arrive) at a station is 3.0 minutes. This is consistent with the standard headway at 2 minutes and 9 seconds.
3. **LRT2 accessibility.** Passengers rated overall accessibility to the LRT2 rail system as good. This includes access leading to the stations, stairs, escalators and lifts, and queuing at ticket booth/ vending machines and turnstiles.
4. **LRT2 comfort.** Riders are comfortable with seating. Commuters boarding near end-stations like Santolan rated comfort higher than those boarding at middle stations like Cubao. Riders noted that elevators and escalators were sometimes out of order. There were also complaints on rest rooms.
5. **LRT2 safety and security.** Passengers’ perceptions on safety and security within the trains and stations are notably good. Despite the presence of security personnel, however, various incidents have been recorded by LRTA which usually involve personal belongings.
6. **Non-rail operations.** These are activities that are not directly required to operate the rail system. LRTA is incorporating commercial operations as added attraction and convenience to the riding public, and generating needed additional income. The business sector is involved, e.g., as advertisers; as Wi-Fi service provider.
7. **Operations and Maintenance (O&M).** LRT2 is being operated and maintained as planned. Even though LRT2 is a government-owned and operated urban rail, its performance has been better than Line 1 and Line 3. LRTA has responded swiftly to isolated incidents including the train collision on May 18, 2019.

MAIN RECOMMENDATIONS

1. **Operating hours.** LRTA should trial test (within 2019) an extension of rail operating hours up to 12:00 midnight, to gauge effects on ridership and financial viability. With emerging work shift patterns and 24/7 business operations, LRT1 and MRT3 might also explore this recommendation.
2. **Expand Passenger Assist Railway Display System (PARDS).** LRTA should upgrade (within 2019) the PARDS to include regular on-line surveys to enable LRTA to more regularly “engage in a conversation” with riders. LRTA can institutionalize (within 2019) the Rapid E-survey of Riders using LRT2 Stations Wi-Fi.

Question #3: Were the intended economic benefits of the project realized? By how much? How could cost recovery be improved?

MAJOR FINDINGS AND CONCLUSIONS

1. **LRT2 patronage.** A substantial majority (93%) of households living within the project impact area have members who take LRT2. In the non-project area, less than 10% of respondents have members riding LRT2 – as expected, given that said area is more than one kilometer away from any LRT2 station. Benefits will rise along with ridership.
2. **Ridership profile.** There are slightly more males (52%) than females (48%), as similarly noted in the previous (2008/ 2009) Ex-Post Study. Out of every 10 riders, four (4) are studying while three (3) are working. In addition, majority (88%) of riders do not own a vehicle. Riders are on average 38 years old. Around 3% are children, while 10% are senior citizens.
3. **VOC savings.** With average LRT2 trip length going up from 6.6 km (1991) to 8.05 km (2018), and estimated VOC savings per kilometer increasing from PhP 0.15 (1991) to PhP 0.17 (2018), LRT2 is generating VOC savings with an estimated value of PhP 92.1 million (2018), compared to the projected PhP 1,000 million (1991). The optimistic ridership projection accounts for VOC savings not reaching the target level.
4. **Travel time savings.** LRT2 is generating savings with an estimated value of PhP 339 million (2018), compared to the target of PhP 1,400 million (1991). Again, the optimistic ridership projection accounts for the target not being reached. A DID analysis with propensity score matching was used to estimate LRT2 impact on travel time of both riders and non-riders. Compared to the baseline (1991) figure of 10.3 minutes, the current net travel time reduction is computed at 8.8 minutes, which however is statistically insignificant. In any case, the pivotal view is that transport chaos would occur without LRT2 operating along R-6.
5. **Travel expense reduction.** Travel expenses expectedly rose as prices hardly ever go down. Nominal daily expenses of LRT2 riders averaged PhP 62.00 per round trip. Travel expense increased by an average of PhP 20.00 in the project area, which converts to PhP 10.00 in 2006 prices. Considering an average of nine years' use of LRT2, the yearly travel expense increase is 4% in the project area.
6. **Social inclusivity.** Majority of LRT2 riders fall under two (2) professions, both of which are building blocks for equitable and sustainable development: students (44% of total) and employees (31%). Six out of every ten riders reached high school level, and less than one-fourth are college graduates. Over half of riders (56%) are middle income (PhP 15,917 to 50,250 monthly income); one-third, lower income (max. PhP 15,917 monthly income vs. income threshold of PhP 10,481 in 2018).

MAIN RECOMMENDATIONS

1. **Projections and baseline.** The ridership projection is close to three times the attainable level. Recalling the Pickrell effect, NEDA should ensure that future projects will generate realistic ridership and other projections, as these will affect impact evaluation ratings. Further, NEDA should ensure that a baseline study is conducted for all major projects.
2. **Nominal vs. real expenses.** Project evaluators, in analyzing transport and other expenses, should take into account inflationary effects. Fares can be seen to go down: (i) in terms of a

benchmark fare charged by alternative transport mode/s such as TNVS; and/ or (ii) in real terms, by deflating current expenses so that these will be comparable to a given base year.

3. **Travel time savings.** Project evaluators should assess savings based not only on the train ride itself but rather on the entire “LRT experience”, from entering the station, queueing, waiting for the train, and exiting the station. Beyond LRT2, time savings analysis must cover the entire origin-to-destination journey, including connecting rides via feeder transport, in the context of an integrated transport system approach. Value of travel time savings should be expressed in both nominal and real terms.

MAJOR FINDINGS AND CONCLUSIONS: FINANCIAL PERFORMANCE AND ECONOMIC IMPACT

1. **Expected economic impact at proposal stage.** Based on projected VOC and travel time savings as quantifiable benefits, the project was deemed economically viable given the 1990s circumstances when it was proposed. The Economic Internal Rate of Return (EIRR) was 18% compared to the SDR of 15%.
2. **Expected financial performance at proposal stage.** As a social investment, LRT2 is expected to charge affordable fares. It is implied that the project will not be able to fully recoup its investments. However, LRTA has to maintain sufficient resources to fulfill its mission.
3. **Potential financial performance at start of construction.** LRT2 is financially feasible when the hurdle rate is 6%. However, it is no longer financially feasible when the hurdle rate is raised to 10%. LRT2 is financially viable if a low return on investment is expected.
4. **Variance analysis.** Comparing actual and planned costs, Unfavorable Variance was reported for the superstructure, consulting services, and interest and tax levies. The extended construction period and a strong Japanese Yen compared to the Philippine Peso were main causes of Unfavorable Variance.
5. **Economic impact assessment.** By comparing the Social Discount Rate (SDR) (10% in 2016) with the EIRR of LRT2 (15.35% at the time of the previous Ex-Post Study), LRT 2 is deemed to be economically viable.
6. **Impact on business.** Favorable perceptions about LRT2 are grouped into thematic areas: businesses more accessible to customers; new business opportunities; higher sales; and improved connection with suppliers. Less positive impacts include: no change in the nature or financial performance of business; more intense competition; and reduced business activity.
7. **Impact on land values.** LRT2 is one of the factors affecting land values. However, project impact is not conclusive. Of the 22 barangays classified as influence areas in this study, seven (7) were studied and found to have higher land values. However, the increases do not display any consistent trend.
8. **Financial performance assessment.** The baseline Farebox Ratio is 381% to 403%. From 2008 to 2017, the Farebox Ratio was less than 100%. The below-par ratio can be attributed to the amount of operating cost, cost structure, and low ridership. The previous Ex-Post Study noted that revenues barely cover operating expenses, and “that the financial status of LRTA is in critical condition”.



MAIN RECOMMEDATIONS

1. **Fare increase.** LRT2 patrons value faster travel time much more than transport fare/ expenses. In this light and to enhance financial viability, LRTA should consider a slight fare increase of PhP 1.00 to PhP 2.00 (within 2019) across the current destination-based fare matrix. LRTA should balance two (2) considerations: (1) financial sustainability; and (2) affordability by patrons who are fixed-/ low-income earners, as well as students who comprise the majority of loyal patrons. Fare can be reviewed every two years and linked to price indices, to maintain revenues required for operation and maintenance.
2. **Non-rail income.** LRTA should aggressively pursue strategies to raise non-rail revenues (starting 2019), through institutional tie-ups with business groups, tourism agencies, and advertising firms. LRTA should continue to pursue naming rights to stations such as done for MRT3 Monumento Station. In combination with pursuing non-rail income, LRTA could seek an additional subsidy from the national government (starting next budget year).
3. **Subsidies.** LRTA should seek an additional subsidy from the national government, or expand sources of income to help sustain its operations (starting 2019).
4. **Land value study.** Since the evaluation findings are not conclusive, NEDA-MES could commission a follow up study to be done as soon as updated zonal values become available.

Question #4: Were there any unintended economic/financial benefits realized and costs incurred due to the project?

MAJOR FINDINGS AND CONCLUSIONS

1. **LRT2 “school bus service”.** The project impacts significantly on education. The 44% share of students translates to 100,000 regular school bus riders. LRT2 is conveying students in a manner that is safe, comfortable, efficient and affordable. Without LRT2, students would suffer from traffic chaos.
2. **Boosting the poor man’s taxi and *dyip*.** LRT2’s positive impact on the tricycle and jeepney sectors – as feeder transport – is noteworthy. The transport modal split shows PUJs as most prominent public transport, followed by tricycles.
3. **Unintended agglomeration.** Agglomeration is the process by which business enterprises cluster in a particular location in order to share common facilities and capitalize on economies of scale. It can also cause over-crowding and traffic congestion. Migration towards LRT2 stations is not limited to businesses. Loyal riders relocate to condos/ dorms sprouting near LRT2 stations.
4. **Unintended traffic generator.** As a result of agglomeration, LRT2 stations have become traffic generators. Customers enter, park, and exit shops located around stations. Students, employees, and other riders now residing closer to stations are themselves adding to the congestion.

MAIN RECOMMENDATION

1. **Institutional coordination.** Recognizing the project's agglomeration effects, LRTA, MMDA, Land Transportation Franchising and Regulatory Board (LFTRB) and Local Government Units (LGUs) should collaborate more closely to better rationalize feeder transport and traffic management in the vicinity of the LRT2 stations (starting 2019).

Question #5: Is the project contributing to an alternative transport system that is affordable, safe, comfortable, reliable, efficient and sustainable?

MAJOR FINDINGS AND CONCLUSIONS

1. **Modal split.** LRT2 operations along R-6 provided the ideal transport solution to address the growing road congestion dilemma. Despite the low day-by-day ridership average of 184,476 (2009-2018), the daily person-trips served by LRT2 would require an equivalent of about 13,177 PUJs or 18,488 UV Express – or even 2,635 buses. Without LRT2, R-6 will be one of the most congested roads in Metro Manila.
2. **Comfort, convenience and safety.** Despite the distinctive benefits of LRT2, some commuters are still not convinced to shift away from their current mode of choice. Non-rail riders will shift to LRT2 for longer trips that are comfortable, convenient and safe.
3. **Operational efficiency.** LRT2 is currently operating inefficiently due to low revenues. The number of operational rolling stocks is half the original fleet. This poses risks in LRTA's operations if and when some units start to break down, considering the whole system is over 15 years old.
4. **Sustainability.** LRT2 is unsustainable given its current situation. The main challenge to LRTA is to increase daily ridership to about half a million passengers. Otherwise, the situation will become more untenable in the next year or so, and compromise overall performance and public image.
5. **Social inclusivity.** There is strong evidence that LRT2 is contributing towards developing an alternative transport system that is affordable, safe, comfortable, reliable, efficient, and sustainable. On reliability, close to 100% of HH survey respondents gave a rating of 3 and 4, using a scale of 1 to 4 (lowest to highest). Similarly, high perception ratings are given for comfort. Security perception ratings are most frequently high "3s" and very high "4s".
6. **Alternative transport system.** The project continues to be highly relevant, as also noted in the previous (2008/ 2009) Ex-Post Study. The project goal was initially couched in terms of an alternative system, as rail is more efficient, environment-friendly and thus, more sustainable compared to vehicles running on internal combustion engines. The physical lay-out of Metro Manila, not to mention transportation traditions, however, calls for complementation between light rail services and other means of transport. The objective is not for light rail to replace any particular transport mode but rather, to improve the whole transport system.

Privatization. This is not a guarantee of success especially in mass transit. It should be noted that most mass transit systems are not profitable, and the majority normally achieves breakeven performance. **Privatization of mass rail needs to be further studied.** LRTA has a track record proving its ability and potential to spearhead a prime initiative in mass transport.

Despite low revenues and budget constraints, LRTA has managed to maintain operations as well as a good public image.

MAIN RECOMMENDATIONS

1. **LRT2 replication.** If Light Rail Manila Corporation (LRMC) becomes successful with its business strategy, LRTA – being the only mass transit agency in the country – must learn how to replicate or even do better than current other rail lines (next three years).
2. **Institutional coordination.** The national government must pull its act together with other agencies, LGUs, and non-government sector, towards strengthening its capacity in mass transit operations (starting 2019). The government has the power to plan, finance and implement plans that will benefit the general public.
3. **Towards sustainability.** LRTA must address (starting 2019) inefficiency (esp. spare parts procurement), unsustainable operations (based on fare box ratio), and comfort issues – while at the same time build on its good performance relating to reliability, affordability and safety and security.

Question #6: To what extent has the project contributed to the overall goal of sustained public transport-based development?

MAJOR FINDINGS AND CONCLUSIONS

1. **Access to key destinations.** LRT2 riders feel it is now easier to go to: (a) schools, 82% of respondents; (b) work, 82%; (c) government offices, 64%; (d) hospitals, allied medical services and place of worship, 59%; (e) commercial or trading centers, 56%; and (f) police stations and local security offices, 56%. Compared to the previous Ex-Post Study, there is palpable improvement in access; for instance, only 24% of respondents then reported enhanced access to place of work.
2. **Democratization of transport.** LRT2 has considerably expanded and diversified destinations accessible to commuters; this change can be referred to as “democratization of transport”. LRT2 enabled many more people to more frequently travel to farther destinations, which before only those with private vehicles/ personal means could do. This phenomenon is similar to that of budget airlines which enabled *every Juan to fly*.
3. **Small Entrepreneurs Rail Line.** LRT2 can serve as “commodities transit” for small business entrepreneurs (SBEs), transporting retail items in manageable packages, broadly replicating the concept of a farm-to-market road. Divisoria and Antipolo can become end-to-end SBEs supply hubs to generate more livelihood opportunities. A customized, dedicated car train and security check facility will be needed to cater to SBEs.
4. **Ease of passenger movement.** With LRT2, travel is faster, more comfortable, and convenient – sub-indicators of “ease of movement”.
5. **Democratization of transport.** LRT2 has considerably expanded and diversified destinations accessible to commuters; this change can be referred to as “democratization of transport”. LRT2 enabled many more people to more frequently travel to farther destinations, which before only those with private vehicles/ personal means could do. This phenomenon is similar to that of budget airlines which enabled *every Juan to fly*.

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6. **Length of loyalty.** One key indicator of the sustainability of LRT2 benefits is the number of years during which patrons have been using LRT2. Two-thirds of riders have been taking LRT2 for seven (7) or more years. Almost a fifth have been regular patrons for 13 to 15 years. Only 16% are relatively new customers, i.e., less than one (1) year up to three (3) years; these could include the newer residents of communities near the LRT2 stations.
 7. **Intensity of loyalty.** Another indicator of benefit sustainability, complementing the length of loyalty indicator, is the frequency of using the LRT, which can be referred to as “intensity of loyalty” – alluding to LRT2 being a “brand”. Forty-two percent of household survey respondents took LRT2 at least once or twice each week. In the non-project area, one-fourth of respondents rode the LRT once to thrice each month.
 8. **Traffic volume.** Traffic volume is expectedly rising along with the Metro Manila population (est. 10.0 m in 2000 vs. 12.9 m in 2015). In any case, LRT2 is impacting significantly in reducing traffic volume along R-6. The traffic volume count in Aurora Boulevard and EDSA indicates high dependency on private vehicles instead of public transport. On the other hand, the Recto–Rizal Avenue traffic count shows a lower concentration of private vehicles and the greater role of public transport.

MAIN RECOMMEDATIONS

1. **Bus Rapid Transit (BRT).** LRTA should consider investing in BRT (next two to three years) running under the LRT2 viaduct. Many cities worldwide favor BRT as a more practical way to address the need for urban mobility. A one-kilometer mass transit track is 10 times the cost of a BRT track. BRT can ferry the same number of passengers, without the same heavy infrastructure requirements of light rail.
2. **Feeder transport.** LRTA should diversify its operations to include feeder transport (next one to two years), in order to enhance patronage and further promote LRT2 services. This is commonly done in many countries where the same agency operates not only trains but also inter-linked transport services under the same “brand”.
3. **SBE Line Concept.** LRTA should pursue the strategy of making LRT2 a key driver of enterprise development along R-6 (next one (1) to two (2) years). A feasibility study should be made to validate business potentials.

The impact evaluation findings, conclusions and recommendations per indicator are summarized in matrix format in Annex 1, intended to provide the reader with quick access to the full range of main evaluation results.