

Ex-Ante Evaluation (for Japanese ODA Loan)

1. Name of the Project

Country: Republic of India

Project: Chennai Metro Project (IV)

Loan Agreement: March 4, 2016

Loan Amount: 19,981 million yen

Borrower: The President of India

2. Background and Necessity of the Project

(1) Present State of Development and Problems of the Urban Transportation Sector in India

With the recent rapid urbanization, the number of registered automobiles and scooters in India has risen dramatically over years since FY 2002 at the average increase rate of 10.5%. On the other hand, the improvement of public transportation infrastructures has not been progressed and its rate of use has decreased from 69% in 1991 to 55% in 2001. In the large cities including Chennai, in particular, traffic congestion has become a serious problem in accordance with the increasing needs of the road transportation, which caused to economic loss and serious health damage due to air pollution, noise, and other pollution generated by automobiles. Thus, the improvement of public transportation system is necessary for reducing traffic congestion and improving urban environment.

The Chennai Metropolitan Region in the state of Tamil Nadu is the largest urban region in South India with the fourth largest population in India. The population in the region has rapidly grown from 4.5 million in 1981 to 7.06 million in 2001 and achieved to 8.7 million in 2011. The population density of the city of Chennai, the center of the region, is 26,000 persons/km², which is one of the most densely populated cities in the world. The increase of the number of registered automobiles is remarkable in accordance with the population growth, the figure from 2001 to 2011 has been doubled or more. Thus, the average speed of vehicles in major roads in the city is about 15 km, causing serious traffic congestion.

(2) India's Development Policies for the Urban Transportation Sector and the Role of the Current Project

In its Twelfth Five-Year Plan (April 2012 to March 2017), the Government of India focuses on the improvement of public transportation system from the perspectives of safety, energy efficiency, and social environment conservation, in addition to responding to transportation needs in accordance with the recent economic growth, and estimate its investment amount of 1,300 billion Indian rupee for the metro project implemented within the period of the Plan.

In the Chennai Metropolitan Region, given the difficult circumstances for enhancing transport capacity of existing public transit system (bus and railway) and improving road networks, the improvement of a mass rapid transit system has become a large pillar of urban transportation policy and measures for urban environment issues of the state of Tamil Nadu in order to reduce traffic congestion and respond to automobile pollutions. The importance is also stipulated in the Chennai Comprehensive Transportation Study (August 2010) prepared by the Chennai

Metropolitan Development Authority.

(3) Japan and JICA's Policy and Operations in the Urban Transportation Sector in India

In Japan's Country Assistance Program For India (May 2006), "promotion of economic growth" is set as one of the priority areas and assistance is to be provided to the development of city transportation system (railways, truck roads, airports and ports) from the perspectives of realizing effective and efficient development in urban regions and industrial cluster areas. Moreover, given serious issues of economic loss and automobile pollution, such as air pollution, noise, etc., JICA Country Analysis Paper for India (May 2012) indicates the necessity of the improvement of large-scaled public transportation system in light of the urban development plan in order to reduce traffic congestion and mitigate automobile pollutions. Thus, the Project is consistent with the Program and Analysis. As of February 2016, JICA received authorization to provide ODA loans to India of the amount of 952 billion yen for 22 projects in the urban transport sector (which accounts for 68.4% of the transportation sector in India).

(4) Other Donors' Activities

In the urban transport sector, the World Bank provides its assistance through Mumbai Urban Transport Project (the improvement of roads and suburban railways) and to the improvement of the Eastern corridor in building freight-only railway lines. Asian Development Bank has assisted the railway sector especially through organizational reform of Indian Railway and other tangible support while provided its support to the urban railway sector; 250 million dollars to Bangalore Metro in March 2012 and 176 million dollars to Jaipur Metro in May 2014.

(5) Necessity of the Project

JICA has provided its support to metro projects in the metropolitan regions (Delhi, Bengaluru, Kolkata, Chennai, and Mumbai). The Project is required as measures for serious traffic congestion in Chennai following to Phase I to Phase III, and is in line with the issues and development policy of India as well as assistance policy of Japan and JICA. Therefore, JICA's support for implementing this project is highly necessary and relevant.

3. Project Description

(1) Project Objective

By constructing a mass rapid transit system in the Chennai Metropolitan Region, which is located in the south Indian state of Tamil Nadu, this project is to address the increasing need for transportation, thereby developing the regional economy and improving the urban environment with reduced traffic congestion and traffic pollution.

(2) Project Site/Target Area

Chennai Metropolitan Region, the state of Tamil Nadu

(3) Project Components

1) Civil and construction works, track construction

Line 1: approx. 23km/17 stations (elevated section: approx. 9km/6 stations; underground section: approx. 14km/11 stations)

Line 2: approx. 22km/17 stations (elevated section: approx. 12km/8 stations; underground section: approx. 10km/9 stations)

* Two stations among above are the intersection of Line 1 and Line 2. Thus, the total number of stations on Line 1 and Line 2 is 32 stations (elevated section: 13 stations; underground section: 19 stations).

2) Electrical and mechanical works, signal and telecommunication works, automatic charge collection system, etc.

3) Procurement of train cars (168 cars: 42 trains, 4 cars per train)

4) Consulting services (Design review, bidding support, construction supervision, etc.)

Procurement method: 1) to 3) by international competitive bidding and 4) by short-list method

(4) Project Cost

331,358 million yen (Loan amount: 150,274 million yen)

(5) Project Implementation Schedule/Cooperation Period

November 2008 – August 2016 (94 months in total). The project completion is defined as the commencement of the service (August 2016).

(6) Project Implementation Structure

1) Borrower: The President of India

2) Guarantor: none

3) Executing Agency: Chennai Metro Rail Limited (CMRL)

4) Operation and Maintenance System: as above (3)

(7) Environmental and Social Considerations/Poverty Reduction/Social Development

1) Environmental and Social Considerations

① Category: A

② Reason for Categorization:

This project is classified as Category A because it has the potential to exert significant negative impact by being classified into railway sector under the "Japan Bank for International Cooperation Guidelines for Environmental and Social Considerations" (dated April 2002).

③ Environmental Permit:

Preparation of an Environmental Impact Assessment (EIA) report for this project is not required under Indian law. However, an EIA report was completed in May 2008.

④ Anti-Pollution Measures

This project takes measures during construction to adequately control pollutants, construction vehicles, and heavy machines based on environment management plans. Measures will be taken to mitigate noise by installing noise reduction walls and pads after starting service. So far, no significant problems have occurred during construction in terms of air quality, noise, and vibration.

⑤ Natural Environment:

The project sites are located in an urban area and the planned track passes along existing roads. Therefore, it is likely to have a minimal adverse impact on the natural environment.

⑥ Social Environment:

The project involves land acquisition of 77.62 ha (of which, 13.87 ha is private land) and resettlement of 550 households (including 522 illegally settled families), and 215 shops.

The process of acquiring this land was carried out according to the compensation policy, resettlement plan, and laws for acquiring land stipulated by the CMRL, upon discussion with those involved in land acquisition and resettlement. By August 2014, acquisition of all lands and the resettlement of residents had been completed. The CMRL and NGOs worked together to monitor living conditions after resettlement and the success of the income restoration program. So far, no significant problems have been reported.

⑦ Other/Monitoring:

The contractor of each construction work will monitor noise and vibration, air quality, water quality, soil contamination, and ground subsidence under the supervision of the CMRL during the construction phase of the Project and report the results to JICA. When in operation, the CMRL will monitor air quality, water quality (surface water in bridge section and water discharged from railyard), and vibration and noise and report the results to JICA.

2) Promotion of Poverty Reduction:

None in particular

3) Promotion of Social Development (e.g. Gender Perspective, Measures to Prevent Infectious Diseases Including AIDS, Participatory Development, Consideration for the Handicapped, etc.):

In the country with a risk of AIDS infection, the project implements a large-scaled construction works with a significant portion of the labor force concentrated in the site. Thus, the high risk of transmitting is considered.

In the Project, HIV/AIDS prevention plan will be formulated, and each contractor is responsible for taking the measures in line with the plan.

Based on the laws of India, the stations and coaches are under construction taking into consideration of needs of the elderly and the physically challenged (e.g., user-friendly design of elevators and restrooms, announcements at stations, signs in Braille, space for wheelchairs).

(8) Collaboration with Other Donors

None in particular

(9) Other Important Issues

None in particular

4. Targeted Outcomes

(1) Quantitative Effects

1) Operation and effect indicators

Indicators	Baseline (actual value in 2008)	Target (2018) [2 years after project completion]
Operation rate (%/year)	—	92
Car traveling distance (1,000	—	46.2

km/day)		
Line 1	—	23.8
Line 2	—	22.4
Number of Running Trains (No. of trains/day, one direction)	—	260(X=4.5)
Volume of Transportation (million persons-km/day)	—	5.6
Line 1	—	3.2
Line 2	—	2.4
Passenger Revenue (million Rupee/day)	—	24.2
Line 1	—	14.0
Line 2	—	10.2

(Note) Line 1: Washermanpet – Chennai Airport

Line 2: Chennai Central - St. Thomas Mount

Peak time: every X-minute operation is assumed

Number of running trains: Total of Line 1 and Line 2 as they are loop line.

2) Internal Rate of Return

Based on the conditions indicated below, the economic internal rate of return (EIRR) of the Project will be 11.9% and the financial internal rate of return (FIRR) will be 7.5%.

【EIRR】

Cost: Project cost (excluding tax), operation and maintenance cost

Benefit: Effects of reducing operation and maintenance cost of existing transportation system and roads, travel time of uses of this line and other transportation users, operation and maintenance cost of bus and other transit systems by mitigating traffic congestion, and the number of traffic accidents and pollutions.

Project Life: 30 years

【FIRR】

Cost: Project cost, operation and maintenance cost

Benefit: Fare revenue, advertisement revenue, revenue from real-estate development

Project Life: 30 years

(2) Qualitative Effects

The qualitative effects of the Project include the improvement of traffic conditions, mitigation of traffic pollutions, reduction of the green gas emission by promoting modal shift, increase of convenience by securing punctuality of travel, and economic development in the Chennai Metropolitan Region.

5. External Factors and Risk Control

- (1) Precondition: none in particular
- (2) External Factors: none in particular

6. Evaluation Results and Lessons Learned from Past Projects

(1) Results of Evaluation of Similar Past Projects

The result of ex-post evaluation of the Beijing Urban Railway Construction Project in China indicates that the establishment of financially independent project implementation structure is important for securing a proper operation and maintenance system.

(2) Lessons for the Project

In order to strengthen a financial aspect of the project implementation structure, the rate of use is necessary to increase. To this end, the CMRL has promoted coordination with the Chennai Unified Metropolitan Transport Authority so as to avoid competing underground routes and bus routes. The bus routes will play a role of feeder transit of the Project, and 30 running routes in total have already been specified. Moreover, for the purpose of future strengthening financial structure, the executing agency is considering the relevant project in the area of public relation, real estate development, etc.

7. Plan for Future Evaluation

(1) Indicators for Future Evaluation

- 1) Operation rate (%/year)
- 2) Car traveling distance (1,000 km/day)
- 3) Number of Running Trains (No. of trains/day, one direction)
- 4) Volume of Transportation (million persons-km/day)
- 5) Passenger Revenue (million Rupee/day)

(2) Timing

Two years after project completion