Japanese ODA Loan

Ex-Ante Evaluation (for Japanese ODA Loan)

１．Name of the Project

Country：The People's Republic of Bangladesh
Project：Dhaka Mass Rapid Transit Development Project (IV)
Loan Agreement：12 August, 2020

２．Background and Necessity of the Project

(1) Current State and Issues of the Urban Development Sector and the Priority of the Project in Bangladesh

The population of Dhaka increased from 6.62 million to 17.6 million between 1990 and 2015 (United Nations Population Division, 2018). This population increase has caused a rapid increase in transportation demand, which in turn has led to chronic traffic congestion and air pollution. As a result, the average vehicle travel speed in Dhaka was 6.4 km/h in 2014, which is less than half that of central Tokyo (14.7 km/h, according to the Ministry of Land, Infrastructure, Transport and Tourism in 2015). Economic loss due to traffic congestion are estimated to be US$ 3.868 billion per year (Bangladesh Water Development Board, etc., 2013). In terms of air pollution, the annual average PM_{10} concentration is 146 $\mu g/m^3$, which is much higher than the environmental standard set by the World Health Organization ($20\mu g/m^3$ - $70\mu g/m^3$). Furthermore, there is also concern about the health hazards to residents of the Dhaka Metropolitan Area due to the increasing exhaust fumes caused by severe traffic congestion. These factors have worsened the country's investment climate, creating a major bottleneck for economic and social development.

In the Seventh Five Year Plan (FY 2016/2017–FY 2020/2021), the Government of Bangladesh has set economic growth and poverty reduction as its overall goals, with the importance within Transport and Communication Development Strategy given to alleviating traffic congestion on roads in urban areas though appropriate investments. In regard to these goals, in August 2016, the Government of Bangladesh revised the Strategic Transport Plan for Dhaka (STP). In the revised STP, five MRT routes and two BRT routes were reclassified as high-priority lines. MRT Line 6 was also identified as one of the high-priority lines in the revised STP.

The Dhaka Mass Rapid Transit Development Project (hereinafter referred to as "the Project") will alleviate traffic congestion and air pollution through the construction of the 19.8 km MRT Line 6, connecting the northern and central parts of the capital city of Dhaka. The Project is positioned as the highest priority route in the revised STP mentioned above.

(2) Japan and JICA's Policy and Operations in the Urban Development Sector

The JICA Country Analysis Paper for Bangladesh (March 2019) identifies urban development including urban transport as a priority issue, while Japan's Country

Assistance Policy for Bangladesh (February 2018) has also set forth the priority area of “accelerating inclusive economic growth,” with initiatives for developing transport infrastructure with diversified modes of transport and promoting the efficient movement of people and goods. The Project is thus consistent with this analysis and policy. Additionally, since it will help alleviate traffic congestion in the Dhaka Metropolitan Area, which is becoming increasingly severe, and reduce the negative environmental impact of air pollution, the Project will also contribute to the achievement of SDGs 9 (Industry, Innovation and Infrastructure), 11 (Sustainable Cities and Communities), and 13 (Climate Action).

JICA’s recent major assistance activities in the urban transport sector include the Project on the Revision and Updating of the Strategic Transport Plan for Dhaka (Technical Cooperation, FY 2016-2018), the Project for Establishment of Clearing House for Integrating Transport Ticketing System in Dhaka City Area (Phase 1) (Technical Cooperation, FY 2014-2018), the Dhaka Mass Rapid Transit Development Project (Line 1) (Japanese ODA loan project, E/S, Loan Agreement Signed in 2017, Phase 1, Loan Agreement Signed in 2019), the Dhaka Mass Rapid Transit Development Project (Line 5, Northern Route) (Japanese ODA loan project, E/S, Loan Agreement Signed in 2018), and the Project for Establishment of Clearing House for Integrating Transport Ticketing System in Dhaka City Area (Phase 2) (Technical Cooperation, FY 2019-2022).

(3) Other Donors’ Activity

In addition to supporting the development of the STP, the World Bank implemented the Clean Air and Sustainable Environment Project from 2009 to 2016, which included the detailed design of BRT Line 3 (between the airport and Jhilmil). The Asian Development Bank (ADB) has been providing assistance for the Greater Dhaka Sustainable Urban Transport Corridor Project since 2010, which is developing BRT Line 3 (from Gazipur to Dhaka airport). It is also considering assistance for MRT Line 5 (Southern Route, between Gabtoli and Aftabnagar stations), which is planned to be built parallel to the southern part of MRT Line 5. This, together with the Project, have been positioned as Strategic Partnership for Sustainable and Inclusive Development through Promotion of Quality Infrastructure Investment in Asia and the Pacific.

3. Project Description

(1) Project Objective(s)

The objective of the Project is to alleviate traffic congestion and mitigate air pollution in Dhaka City by constructing the mass rapid transit system, thereby contributing to regional economic development and improving urban environment. It also aims at reduction of the air pollution in the Dhaka by promoting a modal shift from individual vehicle transportation to the public transportation.

(2) Project Site/Target Area

Dhaka North City, Dhaka South City

(3) Project Component(s)

1) Construction of railway structures (total length of 19.8 km; construction of elevated railways, stations, tracks, etc.)

2) Construction of a depot (land development, construction of depot buildings, railway sidings, etc.)

3) Procurement of rolling stock (144 cars: 6 cars × 24 sets)

4) Installation of electric and signal systems

5) Enterprise Resource Planning System (ERP System) (ICB)

5) General consulting services (F/S review, detailed design, tender assistance, construction supervision, training for operation and maintenance, etc.)

6) Consulting services for resident resettlement support

7) Consulting services for institutional development support

(4) Estimated Project Cost (Loan Amount)

371,941million Yen（Loan Amount：72,194million Yen）

(5) Schedule

February 2013 ～ December 2024 (143 months in total). The project will be completed upon the opening of all sections (December 2022).

(6) Project Implementation Structure

1) Borrower：The Government of the People's Republic of Bangladesh

2) Guarantor：N/A

3) Executing Agency：Dhaka Mass Transit Company Limited (DMTCL)

4) Operation and Maintenance System：DMTCL

(7) Cooperation and Sharing of Roles with Other Donors

1) Japan’s Activity: In the Dhaka Mass Rapid Transit Development Project (Line 1) and the Dhaka Mass Rapid Transit Development Project (Line 5, Northern Route), both Japanese ODA Loan projects, urban railways that connect to the Project will be constructed. Additionally, based on the outcome of the previously-implemented Technical Cooperation Project for Establishment of Clearing House for Integrating Transport Ticketing System in Dhaka City Area (Phase 1), the second phase of the project will aim to develop an implementation system for the dissemination of IC cards, as well as full-scale implementation and dissemination of the IC card payment system. Furthermore, through the project for Training and Education on Mass Transit System Operation and Maintenance Management, a Technical Cooperation project approved in FY 2018, capacity development of MRT workers on safety management will be carried out in order to achieve a safe and reliable urban railway.

2) Other Donors’ Activity: N/A

(8) Environmental and Social Consideration/Poverty Reduction/Social Development

1) Environmental and Social Consideration

① Category : A

② Reason for Categorization : The Project falls into the railway sector (located in a sensitive area and likely to have a significantly adverse impact due to its characteristics) under the JICA Guidelines for Environmental and Social Considerations (published in April 2010).

③ Environmental Permit : The Environmental Impact Assessment (EIA) report for the Project was prepared by the Dhaka Transport Coordination Authority (DTCA) and approved by the Department of Environment on July 11, 2011. The Environmental Clearance Certificate (ECC) was approved by the Department of Environment in July 2020. In Bangladesh, environmental permits must be renewed every year, and renewal procedures for up to July 2021 are being carried out.

④ Anti-Pollution Measures : Water is sprinkled periodically to suppress the dust that is expected to be generated during the construction work. Sound absorbers and soundproof walls have been installed to reduce noise and vibration during construction work. Additionally, wastewater that is discharged from the station and train depot when the facilities are in service is being appropriately treated at wastewater treatment facilities.

⑤ Natural Environment : The target area for the Project is not in a vulnerable area such as a national park, nor in the surrounding area of such; therefore, any adverse impact on the natural environment is expected to be minimal.

⑥ Social Environment : Most of the facility construction will be done on the existing road width. It is estimated that 57.3 ha of land will be acquired and the affected number of residents to be 1,499 (of which, 61 live within or near the depot and 1,438 live alongside the railway tracks). No involuntary resettlement is expected to occur. Land owners are compensated pursuant to Bangladeshi law and the RAP prepared in accordance with JICA's Guidelines for Environmental and Social Considerations. In consultation with local residents, an explanation about the Project was given, including a project description, planned routes, measures to mitigate the potential impact on the natural and social environment, an overview of the RAP proposal, and compensation details; however, no particular objections were raised.

⑦ Other / Monitoring : During the construction period, the contractor (supervised by the executing agency) has monitored the changing conditions of air quality, noise/vibration, water quality, and progress of land acquisition and resettlement, etc. This monitoring will be conducted by the executing agency once the facilities are placed in service. Additionally, an external monitoring agency hired by the construction consultant has monitored social considerations.

2) Cross-Cutting Issues : The Project is intended to reduce air pollution and mitigate climate change through the promotion of public transportation, thereby contributing to

reduced GHG emissions. The Project's mitigation effect on climate change (estimated GHG emissions) is expected to be approximately 0.18 million tons of CO_2/year (estimate for 2025).

3) Gender Category : [Gender Project] GI (S) (Gender Activities Integration Project)

Activity component(s)/reason for classification:

On public transportation in Bangladesh, the safety of women cannot be sufficiently ensured, thereby obstructing their use of public transportation. Therefore, since it is necessary to promote women's safety and an understanding of gender on trains and in stations, gender action plans will be implemented; these include the operation of women-only cars at peak times, the installation of surveillance cameras in stations and cars, as well as the promotion of hiring women for construction operations and at managing entities. Consequently, this is categorized as a Gender Integrated Project.

(9) Other Important Issues

The Project incorporates advanced Japanese technologies such as countermeasures for soft soil, rolling stocks and signaling systems, and automatic fare collection systems.

4. Targeted Outcomes

(1) Quantitative Effects

Performance Indicators (Operation and Effect Indicator)

Indicator	Baseline (Actual Value in 2009)	Target (2024) * 【Expected value 2 years after project completion】
1) Passenger Kilometer	—	8629.5
2) Train Kilometer	—	6,528
3) Average Travel Time	105	36.4
4)Operating rate of train	—	80

Note: The travel times indicated above are for the section between Uttara North Station and Motijheel Station.

As a reference value, air pollutant density (density of NO_2 and total suspended particulates [$PM_{2.5}$/PM_{10}] along the railway line) will be monitored.

(2) Qualitative Effects

Facilitation of transportation and physical distribution in the Dhaka Metropolitan Area, development of Bangladesh's economy through the reduction of economic losses by reducing traffic congestion, and mitigation of climate change through the reduction of GHG emissions by promoting a modal shift to public transportation.

(3) Internal Rate of Return

According to the following preconditions, the Project's Economic Internal Rate of Return (EIRR) will be 27.9%. The Financial Internal Rate of Return (FIRR) will be 2.1%.

【EIRR】

Cost: Project costs and operation/maintenance costs (excluding tax)

Benefit: Reduction in vehicle operation costs, travel time, etc.

Project Life: 36 years

【FIRR】

Cost：Project costs and operation/maintenance costs

Benefit：Fare revenues and non-rail revenue

Project Life：36 years

5. External Factors and Risk Control

1) Preconditions: N/A

(2) External Conditions: N/A

6. Lessons Learned from Past Projects

The results of the ex-post evaluation of the Philippines' Metro Manila Strategic Mass Rail Transit Development Project revealed that it is difficult to operate an urban transport business using fare revenues only, that funding and subsidies from the government are needed because a large initial investment is required, and that a detailed financial plan and an action plan for government support should be developed in the project planning phase in order to ensure the financial health of the executing agency.

In addition, the results of the ex-post evaluation of India's past urban railway projects, including the Delhi High-Speed Transit System Construction Project (I)-(VI), indicated that it is necessary to ensure that the preconditions for profitability are satisfied and that, if they are not fulfilled, it is necessary to push for the satisfaction of these preconditions.

As the Project requires a large initial investment and, therefore, its financial soundness needs to be secured, appropriate fare setting will be conducted based on the lessons described above, and government funding (grants) and sub-loan from the government under concessional conditions will be used. Additionally, the DMTCL's financial plans have already been developed as part of the consulting services for institutional development.

Furthermore, in order to secure non-rail revenues in addition to fare revenues, the development and implementation of business plans—including those for generating revenues from public transportation-oriented development, retail tenants in stations, advertising, etc.—will be supported through general consulting services.

7. Evaluation Results

The Project is consistent with the development issues and development policies of Bangladesh, as well as the assistance policies and analyses of the Government of Japan and JICA. Through the development of a mass rapid transit system, the Project

will help alleviate traffic congestion in the Dhaka Metropolitan Area, which is becoming increasingly severe, and help reduce the negative environmental impact of air pollution, thereby contributing to the achievement of SDGs 9 (Industry, Innovation and Infrastructure), 11 (Sustainable Cities and Communities), and 13 (Climate Action). Therefore, the necessity for JICA to support the Project is substantial.

8. Plan for Future Evaluation

(1) Indicators to be Used

As indicated in sections 4. (1) to (3).

(2) Timing

Ex-post evaluation: Two years after the project completion