

Ex-Ante Evaluation (for Japanese ODA Loan)
South Asia Division 1, South Asia Department
Japan International Cooperation Agency

1. Basic Information

Country: India

Project: Dedicated Freight Railroad Construction Project (Phase 2) (III)

Loan Agreement: March 31, 2022

2. Background and Necessity of the Project

(1) Current State and Issues in the Development of the Railroad Sector and the Priority of the Project in India

In India, the amount of freight transport has more than doubled since 2000, while the transport capacity of freight railroad is approaching its limit. The share of the freight railroad in overall freight transport has been on the decline. Thus, developing and reinforcing railroad capable of mass transport in a more environmentally friendly manner than road transport in India is an essential task. In particular, the amount of freight transport along the Golden Quadrilateral connecting Delhi, which is the capital and one of the largest consumption and production centers of India, and Mumbai and Calcutta, which are the east and west gateways to the Indian subcontinent, as well as Chennai, which is the southeast part of India, accounts for about 60% of the overall freight transport in the country. With expected increases in the transport amounts of containerized cargoes, agricultural products, and mineral, as well as industrial resources in the future, Indian freight railroad needs to increase the power and speed of transport, as well as reinforce transport capacity in collaboration with other transport modes (by the Indian Ministry for Railways in 2020).

Faced with the above situation, the Indian government called for the necessity of upgrading and expanding railroad networks, introducing high-speed freight cars, and improving railroad access to ports so that mass transport can be achieved along trunk line railroads in its three-year action plan (FY2017 to FY2019) and 12th five-year plan (FY2012 to FY2016). The Indian government particularly highlighted the necessity of the early development, upgrade, and expansion of passenger and freight transport along the dedicated freight corridors (DFC) between Delhi and Mumbai (west corridor) and between Ludhiana and Calcutta via Delhi (east corridor). The Dedicated Freight Railroad Construction Project (Phase 2) (hereinafter referred to as the “project”) has been promoted based on the above government policy. In the latest national infrastructure pipeline plan

(FY2019 to FY2025), the Indian government also highlights the importance of economic reform through the development of transport infrastructures, including railroad. Furthermore, the government's policy speech for the FY2021 budget touched upon the allocation of an increased budget to the railroad sector by 110% compared to the previous year in order to meet the necessity of further reinforcing transport capacity and the setting of railroad sector as a prioritized sector because reducing the cost of transport as the basis of the economic development of India is one of the main strategies and DFC development is indispensable. Thus, the project is suitable for the above development policy of the Indian government.

(2) Japan's and JICA's Cooperation Policy in the Railroad Sector and the Priority of the Project

In the country-by-country development cooperation policies for India (March 2016), connectivity reinforcement through the development of transport infrastructures, etc., is one of the priority fields and the promotion of railroad development is included as one of the measures to reinforce the connectivity among major industrial cities, economic zones, and regions while keeping in mind the importance of eliminating bottlenecks in the investment and growth of infrastructures. The reinforcement of industrial competitiveness through the development of urban infrastructures, etc., is another priority field for India and the measure selected is promoting the transport networks, etc., in major metropolitan areas for the purpose of alleviating traffic congestion, streamlining passenger and freight transport, improving urban environments, etc. In addition, in its country-by-country analysis paper for India (March 2018), JICA's analysis reveals that India needs assistance in infrastructure development, including trunk railroads, urban railroads, roads, and ports, to eliminate the bottlenecks in its economic development. Furthermore, JICA's analysis identifies the necessity of promoting cooperation that helps India to deal with environment and climate change problems as a measure to assist sustainable and comprehensive national growth. Thus, the project also corresponds to these policies and analysis results. The project is also considered to contribute to the following: SDG 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; SDG 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation; SDG 11 Make cities and human settlements inclusive, safe, resilient and sustainable; and SDG 13 Take urgent action to combat climate change and its impacts. Therefore, it is

highly necessary to assist the implementation of the project.

(3) Other Donors' Activities

The World Bank (hereinafter referred to as the "WB") has provided about US\$2,725 million in aid to India for the development of a section of the east DFC between Ludhiana and Mughalsarai measuring 1,193 km. The Asian Development Bank has promoted the development of energy-efficient transport modes and provided \$500 million and \$176 million for the railroad projects of Bengaluru Metro and Jaipur Metro respectively.

3. Project Description

(1) Project Objective

The project allows India to meet the demand of freight transportation, which is expected to grow at a high rate in the future, and to streamline logistics networks through the construction of new lines between Dadri and Rewari and between Baroda and Mumbai in the planned distance between Delhi and Mumbai and the introduction of a fully automatic signal and communication system as well as high-output and high-speed locomotives, thereby contributing to a wide range of economic development in India.

(2) Project Site/Target Area

Uttar Pradesh, Haryana, Gujarat, and Maharashtra States (total population: about 410 million (2011))

(3) Project Components

- 1) Civil engineering and architectural work: Structure construction works including roadbed, bridges, freight stations, and junction stations
- 2) Truck laying work: Rail laying, etc.
- 3) Electric and mechanical work: Development of overhead lines, substations, etc.
- 4) Signal and communication work: Development of a signal and communication system
- 5) Railroad vehicle procurement: Electric locomotives (50 units of 6,000-horsepower and 150 units of 9,000-horsepower locomotives)
- 6) Consulting service: Construction supervision, quality and safety control, assistance in commissioning, review of operation and maintenance manuals, establishment of operation and maintenance plans, assistance in project implementation (including the implementation of training programs), implementation of environmental control and resident relocation monitoring plans, social development (publication, resident

enlightenment activity, HIV/AIDS prevention activity), etc.

- (4) Estimated Project Cost
403,258 million Yen (Japanese ODA loan (for the tranche III): 116,520 million Yen)
- (5) Schedule
July 2010 to May 2027 (203 months in total)
Project Completion is defined as that all facilities are put in service (in May 2025).
- (6) Project Implementation Structure
 - 1) Borrower: President of India
 - 2) Guarantor: None
 - 3) Executing Agency: Dedicated Freight Corridor Corporation of India Ltd. (hereinafter referred to as the "DFCCIL") and the Ministry for Railways (only for the procurement of electric locomotives)
 - 4) Operation and Maintenance Agency: DFCCIL in charge of the operation and maintenance of main lines and train operation management facilities (trucks, and signal and communication system), etc., and Indian Railways, which is an affiliated company of the Ministry for Railways in charge of the operation of freight transport, including the maintenance of locomotives
- (7) Collaboration and Sharing of Roles with Other Donors
 - 1) Japan's Activity
The project aims to develop a section of the west DFC between Delhi and Mumbai, which measures approximately 1,465 km, together with the phase 1 project for the section between Rewari in Haryana State and Baroda in Gujarat State.
In addition, a plan to reinforce the freight railroad project operation and maintenance system was already established for the Ministry for Railways and the DFCCIL through the dedicated freight railroad operation and maintenance assistance project implemented in the form of technical assistance.
 - 2) Other Donors' Activity
As described in 2. (3), the WB has assisted in the development of the railroad section between Ludhiana and Mughalsarai, the establishment of business and marketing plans for the DFCCIL, and the development of a policy for pricing rail rates, which will be the income source for the DFCCIL.
- (8) Environmental and Social Considerations/Cross-Sectoral Issues/Gender

Category

1) Environmental and Social Consideration

① Category: A

② Reason for Categorization

The project falls under the railroad sector characterized by the likelihood of having environmental and social impacts as listed in the “JBIC Guidelines for Confirmation of Environmental and Social Considerations” (established in April, 2002).

③ Environmental Permit

Although the project is not required to perform an environmental impact assessment (EIA) under domestic laws, an EIA report for the project was created and approved in November 2011.

④ Anti-Pollution Measures

Pollution mitigation measures have already been taken during construction by contractors in the form of dust prevention measures, appropriate storage of construction materials, use of low noise equipment and machines, etc., in accordance with the environmental control plan. Mitigation measures for the noise generated after the project is put in service have been studied, including the installation of noise-insulating walls in densely populated areas if necessary. The mitigation measures considered in the detail design have been incorporated in a detailed environmental control plan and contractors are supposed to implement the measures in accordance with the plan.

⑤ Natural Environment

Although a part of the relevant railroad section runs beside a national park, the section will be constructed parallel to the existing railroad, so the project is considered to have very limited impact on the natural environment and to be capable of minimizing its adverse impact.

⑥ Social Environment

The project involves acquiring land of about 2,252 ha and relocating 3,499 households. The DFCCIL has promoted dialogues with respect to land acquisition and relocation of residents, provided compensation at reacquisition prices, and provided assistance to help residents recover their livelihood based on the resident relocation plan approved by the Ministry for Railways and the compensation policy established in May 2015 in accordance with the new land acquisition law. The procedure to

transfer land ownership from residents to the government on the land register has been completed, but the actual relocation of residents is still in progress (2,552 out of 3,499 households in total have already relocated as of December 2021). According to the DFCCIL, the relocation is expected to be completed sometime in May 2022.

⑦ Others/Monitoring

In the project, the DFCCIL is supposed to indirectly monitor noise, vibration, soil, air quality, water quality, borrow pits, vegetation, land acquisition, and resident relocation through contractors during construction, and to directly monitor noise, vibration, soil, and water quality after the project is put in service.

2) Cross-Sectoral Issues

① Climate change: The project promotes the modal shift in freight transport from roads to railroads, thereby contributing to the reduction in greenhouse gas (GHG) emissions. The project, including the phase 1 project (with the target section between Dadri and Mumbai), is expected to produce a climate change mitigation effect (in the form of a GHG emission reduction) equivalent to about 14.6 million tons per year of CO₂ from 2022 to 2051.

② Measures against infectious disease such as HIV/AIDS: The project is a large-scale project where workers are intensively engaged in construction activities at sites in countries with a risk of HIV/AIDS infection and many of the workers are expected to be itinerants who do not live with their families. Thus, the project is considered to have a high risk of spreading HIV/AIDS infection. To combat this, the DFCCIL, the executing agency, has established safety, health, and environment manuals, including the prevention of HIV/AIDS infection, and taken necessary measures according to these manuals. The DFCCIL has also incorporated provisions requesting contractors to participate in HIV/AIDS prevention activities in contracts. In addition, as a part of its efforts to prevent the spread of COVID-19 infection, the executing agency has agreed to implement a list of measures (36 in total) during the formulation and implementation of the project, and clarified the required activities, such as the development work environments (including preparing epidemic prevention equipment and promoting the code of conduct), supervision with respect to epidemic prevention, and awareness-raising

campaigns. The executing agency is supposed to make quarterly reports with respect to the implementation statuses of the measures so as to ensure that the impact of COVID-19 is being carefully watched and the executing agency has flexibly and appropriately implement the measures throughout the project implementation period.

- 3) Gender Category: ■ Gender Informed (Significant) (Gender activity integrated project)

<Details of Activities/Reason for Categorization> The DFCCIL has agreed to adopt gender equal perspectives, including promoting the employment of women in construction work and in the DFCCIL, and has been implementing actual measures accordingly.

- (9) Other Important Issues

The project has been implemented under the soft loan system based on STEP (Special Terms for Economic Partnership), which allows Japanese technologies to be utilized in the project components to develop trucks, signal and communication system, etc.

4. Targeted Outcomes

- (1) Quantitative Effects

Outcome (Operation and Effect Indicators)

| Indicator | Baseline (2007) | Target (2027) [2 years after project completion] |
|---|-----------------|---|
| Working ratio (%) | N/A | 90 |
| Railroad car running distance (both ways) (thousand km/day) | | |
| Dadri-Rewari | 2.9 | 15.1 |
| Baroda-Mumbai | 41.4 | 68.5 |
| Number of railroad cars (both ways) (cars/day) | | |
| Dadri-Rewari | N/A | 112.9 |
| Baroda-Mumbai | N/A | 167.6 |
| Transport amount (million ton kilometers/day) | | |
| Dadri-Rewari | 4.1 | 25.2 |
| Baroda-Mumbai | 54.7 | 105.9 |
| Maximum speed (km/hour) | 75 | 100 |
| Reduction in transport time (hours) | | |
| Dadri-Rewari | N/A | 3.2 |
| Baroda-Mumbai | N/A | 10.4 |
| Reduction in greenhouse gas emission (million tons/year) (Note) | N/A | 8.1 |

(Note) Value including the effect of the phase 1 project

- (2) Qualitative Effects

Sufficient response to the growing demand for freight transport, streamlining of logistics networks, promotion of a wide range of economic development, etc.

(3) Internal Rate of Return

Based on the following conditions, the economic internal rate of return (EIRR) and the financial internal rate of return (FIRR) of the entire west DFC project (combination of the project with the phase 1 project) are 19.8% and 4.6%, respectively.

[EIRR]

Cost: Project, and operation and maintenance costs (excluding taxes)

Benefit: Freight transport cost reduction effect on growing demand

Project life: 40 years

[FIRR]

Cost: Project, and operation and maintenance costs

Benefit: Freight revenue

Project life: 40 years

5. Preconditions and External Factors

(1) Precondition: None

(2) External Factors: None

6. Lessons Learned from Past Projects

Based on the ex-post evaluation results (in 2008) of the yen loan project “Metro Manila Strategic Mass Rail Transit Development (I), (II) and (III)” in the Philippines, etc., it has been pointed out that when a public firm is in charge of the implementation, operation, and management of a yen loan project, particular attention needs to be given to the financial sustainability of the public firm, and comprehensive assistance (including improving the financial capability and operational efficiency) needs to be extended to it. The project supports the comprehensive reinforcement of the operation and maintenance system, including the financial strategy to be established by the DFCCIL. In a project that comes with yen loan called “Assistance Project for the Operation and Maintenance of Dedicated Freight Railroads,” assistance in reinforcing the operational and maintenance capability was extended through the establishment of an operation and maintenance system reinforcement plan by the Ministry of Railways and the DFCCIL.

7. Evaluation Results

The project is suitable for the development issues in India and the development policies of the Indian government, as well as the cooperation policies and analysis results of the Japanese government and JICA. The project also helps

India to cope with the freight transport demand, which is expected to grow at a high rate in the future, and to streamline the logistics networks through the following: construction of new dedicated freight railroads between Dadri and Rewari as well as between Baroda-Mumbai in Uttar Pradesh, Haryana, Gujarat, and Maharashtra States; and introduction of a fully automatic signal and communication system and high-output as well as high-speed locomotives. The project is also considered to contribute to the following: SDG 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; SDG 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation; SDG 11 Make cities and human settlements inclusive, safe, resilient and sustainable; and SDG 13 Take urgent action to combat climate change and its impacts. Therefore, it is highly necessary to assist the implementation of the project.

8. Plan for Future Evaluation

(1) Indicators to be Used

As described in Section 4.

(2) Future Evaluation Schedule

Ex-post evaluation: 2 years after project completion