

Ex-Ante Evaluation(for Japanese ODA Loan)

South Asia Division 1, South Asia Department

Japan International Cooperation Agency

1. Basic Information

(1) Country: India

(2) Project Title: Dedicated Freight Corridor Project (Phase 1) (V)

(3) Project Site/ Target Area: National Capital Territory of Delhi, The states of Haryana, Rajasthan, Gujarat, and Maharashtra (total population: approx. 500 million (2011 India Census))

Loan Agreement: February 20, 2024

2. Background and Necessity of the Project

(1) Current State and Issues of the Railway Sector and Priority in India

In India, freight traffic is growing at an annual rate of about 10%, while freight rail capacity is approaching its limits. The share of freight transported by rail is also declining, and the development and expansion of railways, which are more environmentally friendly and capable of mass transport than roads, is essential for India's economic growth. In particular, the “Golden Quadrilateral”, linking the capital, Delhi, the country's consumption and production center, Mumbai, the eastern and western gateway of the Indian subcontinent, Kolkata, and the southeast city, Chennai, represents approximately 60% of the country's freight traffic. As containerized cargo and the transportation of agricultural and mineral resources are expected to continue to grow, there is a need for an increase to the capacity and speed of rail freight transportation and to improve transportation capacity by linking with other modes of transportation. (Indian Ministry of Railways, 2020)

In response, the Government of India, in its Three-Year Action Plan (FY2017-FY2019) and the 12th Five-Year Plan (FY2012-FY2016), refers to the need to expand lines and introduce high-speed freight cars to enable mass transportation on major railways and improve access to port facilities. In particular, the need for early development of the Dedicated Freight Corridor (DFC) between Delhi and Mumbai (Western Corridor) and between Ludhiana and Kolkata via Delhi (Eastern Corridor) and for increase in the number of passenger coaches and freight wagons is emphasized and the “Dedicated Freight Corridor Project (Phase 1(V))” (hereinafter referred to as “the Project”) is based on these needs. In addition, the recently announced National Infrastructure Pipeline Plan (FY 2019-

2025) also stresses the importance of transportation infrastructure development, including railways. This Project is in line with such development policies of the Government of India.

(2) Japan's and JICA's Policy Cooperation and Operations in the Railway Sector (especially in relation to key foreign policies such as the Free and Open Indo-Pacific Partnership (FOIP))

Country Assistance Policy for India (March 2016) identifies enhancing connectivity as one of the priority areas of assistance. It states that assistance will be provided for the development of transportation infrastructure, including railways and other sectors that will serve as transportation hubs and networks, in order to enhance connectivity within and between major industrial cities and regions in the country. The Project will also contribute to the low-carbonization of the transportation sector through the development of freight transportation system throughout India. The Project is consistent with the Country Assistance Policy for India and the efforts of "Addressing Challenges in an Indo-Pacific Way (Climate and Environment)" in the New Plan for a Free and Open Indo-Pacific (FOIP). In addition, the JICA Country Analysis Paper on India (March 2018) also states that with a large portion of the population expected to move into the middle class by 2030, there is a need to "develop high-productivity industries" to meet the growing demand for consumption and other services, and to do so, there is a need to strengthen connectivity by developing economic corridors to improve logistics and movement of people. The paper also mentions the need to continue and expand support for infrastructure development and other activities to address the enormous development needs and further stimulate private sector economic activity. In addition, the JICA Global Agenda for Transportation (September 2021) states that efficient transportation to eliminate coordination bottlenecks will be an area of focus in the future, given the significant year-on-year increase in international container transportation, and this Project is aligned with these policies and analyses.

In terms of ODA loans to India, as of December 31, 2023, 83 ODA loans totaling 4,188,628 million yen have been approved for the transportation sector in India. ODA loans to the railway sector include support for metro projects in Delhi, Mumbai, Kolkata, Chennai, Bengaluru, Ahmedabad, and Patna, with 53 ODA loans totaling 3,494,423 million yen as of December. For this Project, a total of 326,532 million yen has been committed for a total of four terms since the Loan Agreement for Phase 1 was signed in October 2009. In addition, a total of

254,255 million yen has also been approved for Phase 2 of the Project, which covers the Dadri-Rewari and Vadodara-Mumbai sections.

(3) Other Donors' Activities

The World Bank (WB), under its Country Partnership Framework for India (for the Period FY18-FY22), is promoting improved connectivity and logistics to enable increased industrial competitiveness and job creation. As part of this, the WB has provided assistance to the Mumbai Urban Transport Project (2002 and 2010 approved, totaling US\$848 million) and the Dedicated Freight Corridor Project (2011, 2014, 2015, and 2022 approved, totaling US\$2,970 million), among others.

The Asian Development Bank (ADB) has recently been pursuing a policy of supporting the modal shift from automobiles to railways and decarbonization of the transportation sector and has supported the Jaipur Metro (amount of approval: US\$157 million (2013)) and the Bengaluru Metro Lines 2A and 2B (amount of approval: US\$500 million (2020)), among others. ADB has also provided support for Mumbai Metro Lines 2A, 2B, and 7 through co-financing with New Development Bank (NDB) (ADB has committed US\$926 million (2019) and NDB US\$260 million (2018)), Chennai Metro Lines 3, 4, and 5 (ADB has committed US\$1,131 million (2022), NDB US\$347 million (2022), etc.).

3. Project Description

(1) Project Description

① Project Objective

The Project aims to cope with the increase of freight transport demand in India by constructing new dedicated freight railway system, thereby promoting comprehensive regional economic development along the freight corridor, through improvement and modernization of inter-modal logistic system handling considerable freight traffic and poised for massive growth.

② Project Components

(a) Civil engineering and construction work: roadbed improvement, bridges, construction of structures such as freight stations and branch stations, etc. (international competitive bidding (tied))

(b) Track construction: Rail laying, etc. (international competitive bidding (tied))

(c) Electrical and mechanical work: construction of overhead lines, substations, etc. (International competitive bidding (tied))

(d) Signaling and communication work: signal and communication system maintenance, construction of automatic level crossing system (international competitive bidding (tied))

(e) Rolling stock procurement ①: Electric locomotive (6,000 hp / 6 axles) (to be manufactured and delivered by the Ministry of Railways of India with its own funds)

(f) Rolling stock procurement ②: Maintenance and inspection of vehicles, etc. (International competitive bidding (tied))

(g) Consulting Services: Construction supervision, quality and safety management, commissioning test assistance, review of manuals for operation and maintenance, assistance in formulating and implementing plans for operation and maintenance (including training program management), implementation and management of environmental management plan and resettlement monitoring plan, social development (public relations and social development (public information and awareness-raising activities, HIV prevention activities), etc. (short list method)

The areas covered by the ODA loan are through (a) to (d), (f) and (g) above.

③ Project Beneficiaries (Target Groups)

Regions served by the Project: Delhi, Haryana, Rajasthan, Gujarat, and Maharashtra (total population: about 500 million (2011 India Census).

(2) Estimated Project Cost

533,225 million yen (Japanese ODA loan of this tranche: 40,000 million yen)

(3) Schedule

October/2009 - November/2029 (242 months)

The commencement of services of all facilities (scheduled for November 2027) is considered as the completion of the Project.

(4) Project Implementation Structure

1) Borrower: President of India

2) Guarantor: N/A

3) Executing Agency: Ministry of Railways (MoR), Dedicated Freight Corridor Corporation of India Limited (DFCCIL)

4) Operation and maintenance system: Indian Railways will possess the electric locomotives, while DFCCIL will operate the electric locomotives as well as operate and maintain the tracks and the signal and communication

system. It is planned that Indian Railways will maintain the electric locomotives and work to produce them on its own. Once construction is complete, DFCCIL will be responsible for operation and maintenance of the main line and train operation and management facilities (track, signaling and communication systems), while IR, a subsidiary of the Indian Ministry of Railways, will be responsible for freight operations, including maintenance of electric locomotives.

(5) Collaboration and Sharing of Roles with Other Donors

1) Japan's Activities:

As described in 2. (2), together with Phase 2 of the Project, which covers the section between Dadri to Rewari and Vadodara to Mumbai, the Project will develop a 1,465km Western Dedicated Freight Corridor between Delhi and Mumbai.

The technical cooperation projects related to the Project include the Feasibility Study on the Development of High-Axle Load Multimodal Dedicated Freight Corridors with Computerized Control for the Delhi-Mumbai and Delhi-Howrah Rail Routes (2006-2007), and the technical cooperation project on the Assistance in Proof Examination for Running Stability of Dedicated Freight Corridor Transportation (2008), and Dedicated Freight Railway Operation and Maintenance Support Project(2015-2019)

2) Other Donors' Activities:

The World Bank is supporting DFCCIL in the development of the Eastern Corridor (between Ludhiana and Son Nagar). The World Bank is also assisting DFCCIL in formulating project and marketing policies for the operational phase, as well as a pricing policy for track rentals, which will be a source of revenue for DFCCIL. These policies will also cover the JICA-supported Western Corridor.

(6) Environmental and Social Consideration

1) Environmental and Social Consideration

① Category: A

② Reason for Categorization:

The Project falls under one of the sensitive sectors (railway) and has one or more sensitive characteristics under the Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations, published in April 2002 ("JBIC Guidelines").

③ Environmental Permit

An Environmental Impact Assessment (EIA) report was completed in August 2009 and approved by the Ministry of Railways on August 13, 2009, although such a report is not required for the Project under Indian law.

④ Anti-Pollution Measures

The anti-pollution measures taken by the contractors during the construction work include anti-dust measures, the proper storage of construction materials, and the use of low-noise equipment among other abatement measures in accordance with the environmental management plan. The noise mitigation measures after the railway section is put into service will include installing soundproof walls in built-up areas as needed. Mitigation measures considered in the detailed design will be reflected in the detailed environmental management plan, and the contractor will implement measures in accordance with the plan.

⑤ Natural Environment

The Project area is mainly farmland or unused land, and the route will detour any wildlife preserve. Thus, the adverse effects are expected to be minimal.

⑥ Social Environment

The Project involves the acquisition of 3,716 ha of land and the resettlement of 1,514 households. DFCCIL compensates the affected residents at the repurchase price and provides support necessary for rebuilding their livelihoods in accordance with the MoR-approved resettlement plan, as well as the entitlement matrix that has been revised under the new land acquisition law. Land acquisition and resettlement have been completed in April 2021.

⑦ Other/Monitoring

During the construction work for the broader project, the executing agencies will, through the contractors, monitor the noise and vibration levels, soil, air and water quality, borrow pits, and vegetation, as well as the land acquisition and resettlement processes. After the facilities are put into service, the executing agencies themselves will monitor the noise and vibration levels, soil and water quality.

(7) Cross-Sectoral Issues:

- ① Climate change response: This Project will contribute to the reduction of greenhouse gas (GHG) emissions by encouraging a modal shift from

freight transport by automobiles to rail transport. The total climate change mitigation benefits (estimated GHG emission reductions) of this Project are approximately 12.79 million metric tons of CO2 equivalent per year.

- ② Measures against infectious diseases: This Project is expected to involve large-scale construction in a country where HIV/AIDS transmission is a concern, where construction workers will be concentrated on the site, and where the workforce involved in the Project is expected to include a large number of mobile workers who live alone and are therefore considered to be at high risk of HIV/AIDS transmission. For this reason, DFCCIL, the executing agency for this Project, has developed a safety, health, and environment manual that includes HIV/AIDS prevention measures, and has taken the necessary steps to ensure that contractors cooperate with the above HIV/AIDS prevention activities in their bidding documents and contracts.

(8) Gender Category

■GI (Gender Informed)

<Details of Activities/Reason for Categorization>

Since the Project did not finalize on setting specific initiatives and indicators that contribute to gender equality and women's empowerment. However, the implementing agency agreed on initiatives on a gender perspective, such as the promotion of women's employment in construction work and the promotion of women's employment within the implementing agency.

(9) Other Important Issues

The Special Terms for Economic Partnership (STEP) were applied to the preceding portions (Phases 1 and 2) of the Dedicated Freight Corridor Project. In these portions, Japanese technology was used in the tracks, the signal and telecommunication system, and other components.

4. Targeted Outcomes

(1) Quantitative Effects

1) Outcomes (Operation and Effect Indicators)

Indicator	Baseline(2007)	Target(2029) 【2 years after project completion】
Operation rate (%)	—	93

Vehicle running distance (in both directions) (1,000 km per day)	37.9	250.8
Number of transport trains (in both directions) (per day)	33	222
Transportation volume (1 million tons/km per day) /3	55.6	336.9
Maximum speed (km per hour)	75	100
Shortened transportation time (hour) /4	—	18.25

/1: Figures based on only the section subject to the Project (between Rewari and Vadodara).

/2: As to each indicator, the current figures based on conventional lines of the IR are set as the baseline.

/3: Railway transportation volume, excluding road transportation volume and others.

/4: The difference between the required time based on the current average speed and that based on the average speed in the target year

(2) Qualitative Effects:

Responding to freight transportation demand, improving the efficiency of logistics networks, and promoting broad-based economic development

(3) Internal Rates of Return:

Based on the assumptions listed below, the economic internal rate of return (EIRR) for the project is 19.91%, and financial internal rate of return (FIRR) will be 4.26%.

【EIRR】

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

Benefit: Effects of reduction of freight transportation costs in contrast to demand growth

Project life: 30 years

【FIRR】

Cost: Project cost, operation and maintenance expenses

Benefit: Revenue from freight charges

Project Life: 30 years

5 . External Factors and Risk Control

(1) Preconditions: None

(2) External Factors: None

6 . Lessons Learned from Past Projects

The ex-post and other evaluations of the Metro Manila Strategic Mass Rail Transit Development Project (I), (II), and (III) in the Republic of the Philippines indicate that when a public enterprise implements a Japanese ODA Loan project and takes charge of the operation and maintenance aspects as well, special attention should be paid to its financial sustainability and that comprehensive assistance is needed to support the enterprise in improving its finances and streamlining its management.

Learning from these lessons, the Project supports the comprehensive strengthening of the operation and maintenance management system, including the financial strategy to be developed by DFCCIL, as well as the development of a plan to enhance the operation and maintenance management system as part of a Technical Assistance Project related to Japanese ODA Loan.

7 . Evaluation Results

This Project aims to achieve efficient freight transportation by constructing new dedicated freight railway lines and introducing a fully automatic signaling and communication system and high-power, high-speed electric locomotives to increase freight transportation capacity, which is in line with India's agenda, development policy, and Japan's and JICA's cooperation policies. In addition, this Project is expected to contribute to the SDGs Goal 8 "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all ", Goal 9 "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation", and Goal 13 "Take urgent action to combat climate change and its impact". Therefore, it is highly necessary to assist the implementation of this Project.

8 . Plan for Future Evaluation

(1) Indicators to be Used

As described in Section 4.

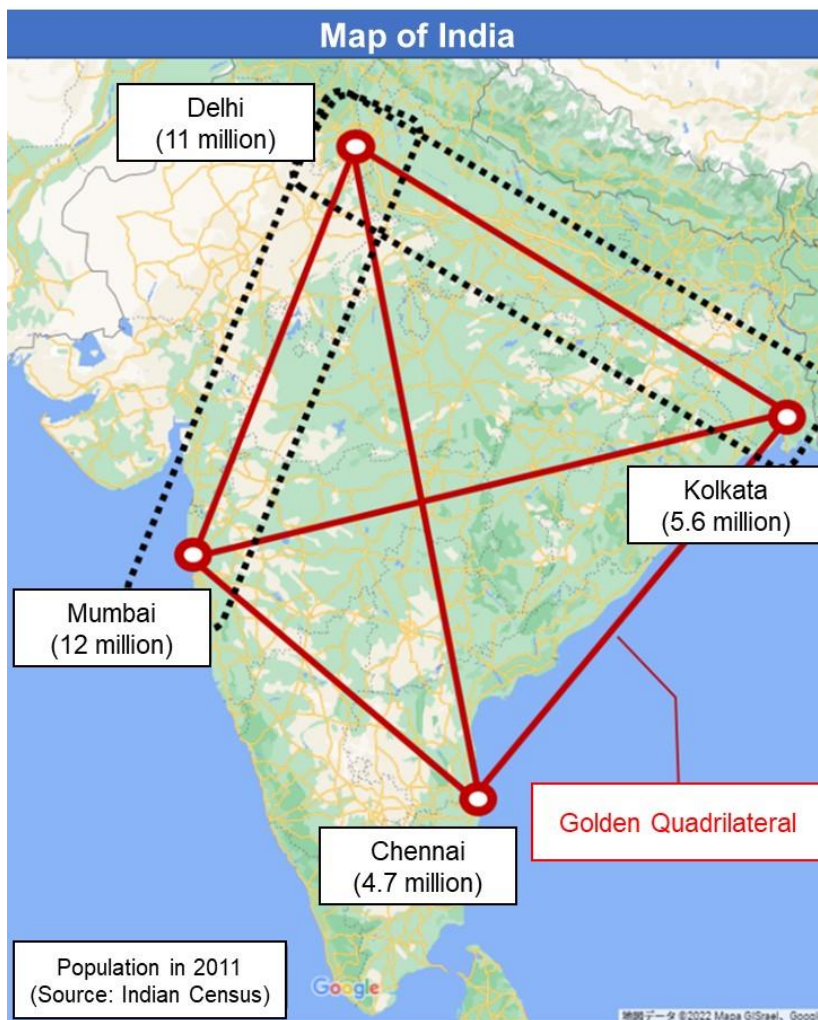
(2) Future Evaluation Schedule

Ex-post evaluation: 2 years after the project completion

END

Appendix: Map of the Dedicated Freight Corridor Project

Map: Dedicated Freight Corridor Project
(Created by JICA based on Google Map)



DFC Project Location Map

