

People's Republic of Bangladesh

FY2019 Ex-Post Evaluation of Japanese ODA Loan

“Dhaka-Chittagong Railway Development Project”

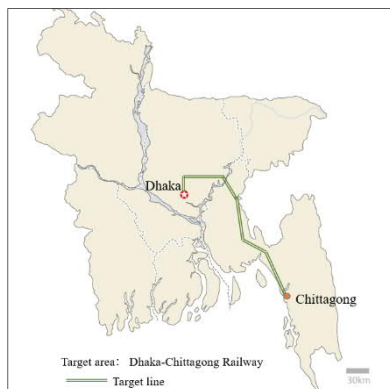
External Evaluator: Hisae Takahashi, Ernst & Young ShinNihon LLC

0. Summary

Under this project, part of the Dhaka-Chittagong Railway line was doubled, the Chittagong station yard was rehabilitated, and locomotives were procured with the aim of enhancing the transportation capacity and improving the quality of service of the Dhaka-Chittagong Railway. This project, under which the railway network and the transportation services of an important section in Bangladesh were improved, is consistent with Bangladesh's development policy and development needs at the time of both project appraisal and the ex-post evaluation, and is also consistent with Japan's assistance policy. Therefore, the relevance of the project is high. In terms of project implementation, the project period exceeded the plan due to unsuccessful bidding and changes in project scope. Also, the project cost largely exceeded the plan due to fluctuations in exchange rates and increases in prices in addition to scope changes and the prolonged project period. Thus, efficiency of the project is low. Regarding the project effects, a certain increase in container traffic handling has been observed though it did not reach the target figures since the project only covered part of the section and since track doubling for the entire section has not been completed. Furthermore, the degree to which operation and effect indicators set at the time of project appraisal were achieved was high, except for container traffic handling, and the convenience of railway services resulting from increasing the number of services and improving punctuality was also confirmed through interviews with railway users, thus indicating that the project has made a significant contribution to improving the quality of railway services. Therefore, effectiveness and impacts of the project are high. As for operation and maintenance, minor problems have been observed in terms of institutional/organizational, technical, and financial aspects, as well as the current status. Therefore, sustainability of the project effects is fair.

In light of the above, this project is evaluated to be partially satisfactory.

1. Project Description



Project Location



Tracks that were Doubled under the Project

1.1 Background

In Bangladesh at the time of the appraisal, projects in the railway sector required more time and funds to see results than road and other projects. For this and other reasons, the government of Bangladesh rarely made any new investments in railway development since independence in the 1970s. Consequently, the most of railway facilities and equipment in use were developed during the British colonial period, which lasted until 1947. Indeed, they became outdated and decrepit, and were unable to fully capitalize on the railway's inherent strengths, namely being massive, rapid, punctual, safe, and environmentally friendly, and thus resulting in reduced transportation volume, poor service and a smaller role for the railway in the overall transport sector.

Meanwhile, in parallel with robust GDP growth (5-6%), demand for freight transportation steadily increased by 5-6% annually in Bangladesh at the time of the appraisal. Particularly rapid growth was seen in demand for transportation along the Dhaka-Chittagong section that connects Dhaka, the capital city and political and economic hub of the country, and Chittagong, the second largest city and industrial hub, as well as in the Port of Chittagong's cargo handling volume, which had grown by more than 10% per year since 2001. In addition, further growth in demand for transportation on this section was expected if Chittagong port facilities were expanded and private companies were attracted to the export processing zones. Although there were high expectations for railways to play a leading role in meeting this increasing demand as an alternative mode of transportation to roads, it was difficult, both in terms of transportation volume and quality of service, for the existed railway facilities to meet such expectations, thus posing a bottleneck for economic growth in the years ahead. Additionally, in order to achieve sustainable development that takes the environment into consideration, a modal shift from road transportation to environmentally friendly railway transportation was indispensable and the development of a railway network to improve railway services in an important section was an urgent issue.

1.2 Project Outline

The objective of this project is to enhance the transportation capacity and improve the quality of services by doubling part of the Dhaka-Chittagong Railway line in Bangladesh, rehabilitating a workshop, procuring locomotives and so on, thereby contributing to social and economic development and improving the environment.

Loan Approved Amount/ Disbursed Amount	12,916 million yen/12,887 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	December 2007/December 2007
Terms and Conditions	<div>Interest Rate</div> <div>0.01%</div> <div>Repayment Period</div> <div>40 years</div> <div>(Grace Period</div> <div>10 years)</div> <div>Conditions for</div> <div>Procurement</div> <div>General Untied</div>
Borrower/ Executing Agency	Government of the People's Republic of Bangladesh/ Bangladesh Railway (BR)
Project Completion	December 2016
Target Area	Along Dhaka-Chittagong Line and in Chittagong City
Main Contractors (Over 1 billion yen)	<ul style="list-style-type: none"> • Max Automobile Products Ltd. (Bangladesh)/Chengdu Ranken Railway Construction Co., Ltd. (Republic of China) /China Railway Materials Import & Export Co., Ltd. (Republic of China) (JV) • Max Automobile Products Ltd. (Bangladesh) • Equipment: Marubeni Corporation (Japan)
Main Consultants (Over 100 million yen)	<ul style="list-style-type: none"> • SMEC International Pty Ltd. (Australia)/Canarail Consultants Inc. (Canada)/DB International GmbH. (Germany) (JV)
Related Studies (Feasibility Studies, etc.)	Special Assistance for Project Formation for Dhaka-Chittagong Railway Development Project (2006)
Related Projects	[ODA Loan Project] <ul style="list-style-type: none"> • Jamuna Railway Bridge Construction Project (June 2018) [International Organization, Other Development Partners] <ul style="list-style-type: none"> • ADB "Railway Sector Investment Program" (2006) • WB "Bangladesh Railway Reform Programmatic Development Policy Credit" (2006)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Ernst & Young ShinNihon LLC

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: October 2019 - January 2021

Duration of the Field Study: January 4 - January 21, 2020

2.3 Constraints during the Evaluation Study

While the main component of this project was double tracking the target section (Laksam-Chinkiasana), the outcome of the project was planned to be generated in the target section based on the assumption that the entire Dhaka-Chittagong section would be double-tracked. However, at the time of the ex-post evaluation, the double tracking of part of the Dhaka-Chittagong section, Akhaura-Laksam, had not been completed. Even in situations where the track doubling of Akhaura-Laksam was not completed, it was possible to confirm increase in the number of passengers of the target section, which was assumed as the effect for the project, since many passengers use the railroad to travel only on some sections of the entire Dhaka-Chittagong section. On the other hand, since major freight is mainly transported on the entire Dhaka-Chittagong section, it is considered to be too early to properly measure the effectiveness since double tracking has not been completed for the entire section. It was thus determined that it would be difficult to evaluate the effectiveness set at the time of appraisal and, instead, the effectiveness was analysed by focusing on the level of achievement of the other operation and effect indicators.



Figure Target Section of Track Doubling
(Laksam-Chinkiasana)

In addition, due to the global outbreak of COVID-19, the second field survey for this evaluation study was cancelled. Therefore, collection of additional information, provision of feedback on the evaluation results to the related organizations, and solicitation of comments, which were scheduled to be carried out as part of the second field survey, were carried out remotely from Japan through local assistant. Since the evaluator was not able to conduct the field survey and considering the restrictions on the local assistant in Bangladesh with regards to in-country travel and conducting meetings and interviews, it was not possible to confirm some of the detailed information that had been planned, and in particular, verification of information related to sustainability was limited.

3. Results of the Evaluation (Overall Rating: C¹)

3.1 Relevance (Rating: ③²)

3.1.1 Consistency with the Development Plan of Bangladesh

At the time of the appraisal, the development plan of Bangladesh, the *First Poverty Reduction Strategy 2004/05-2006/07* (2005), identified the rail sector as a sector that would play an important role in poverty reduction by promoting economic growth and increasing international competitiveness by lowering transportation costs. The need to develop infrastructure, strengthen transport capacity and improve the quality of services in the railway sector was also outlined in the *National Land Transport Policy* (2004) and the *Integrated Multi-modal Transport Policy* (2008), and on the basis of these policies, the government planned to formulate a *National Rail Development Plan* for the next 20 years. In addition, in 2011, the *Bangladesh Railway (BR) Reform Program* was formulated to privatize BR. This program provided a long-term plan that set out the reforms to be implemented to transform the organization into a business unit, improve its financial and human resource systems, and improve its maintenance and management operations³.

The *7th Five Year Plan 2016-2020* (2015), the development plan at the time of the ex-post evaluation, positioned the development of economic infrastructure as one of the top priorities and indicated the need for continued new investment as well as organizational and pricing reforms to modernize the railway sector. Specifically, 1,110 km of double tracking, bridge construction, locomotive procurement, and workshop and maintenance upgrades were identified as key plans⁴. The *Railway Master Plan 2010-2030* approved in 2013 and the *Updated Railway Master Plan 2016-2045* also aim to expand operating capacity, increase and capture freight market share, manage railway assets more efficiently, improve financial efficiency, and integrate the gauge system⁵. Although the exact progress of the *BR Reform Program* up to the time of the ex-post evaluation was not clearly indicated, it was confirmed that the three prerequisites, namely (1) the reorganization of the BR, (2) the formulation of the five-year business plan, and (3) the establishment of KPIs to achieve the goals of the plan, for track doubling and rehabilitating the Chittagong station yard were already implemented⁶.

As noted above, the development policy and plans for the transport and railway sector in Bangladesh, from the time of the appraisal to the time of the ex-post evaluation, have placed importance on the railway sector as part of economic growth and economic infrastructure development, and this is consistent with the project, which aimed to improve rail services through the track doubling of part of the Dhaka-Chittagong section, the procurement of

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² ③: High, ②: Fair, ①: Low

³ Document provided by JICA

⁴ Source: *7th Five Year Plan 2016-2020*, BR, *Information Book 2018*

⁵ Source: BR, *Information Book 2018*

⁶ Source: Document provided by JICA

locomotives, and other related measures.

3.1.2 Consistency with the Development Needs of Bangladesh

At the time of the appraisal, Bangladesh maintained a high economic growth rate (5-6% GDP growth rate) with a proportionate annual growth rate in demand for freight traffic of 5-6%. The Dhaka-Chittagong section was the most important route for BR, carrying approximately 1,442 million people/km and 80,000 TEUs⁷ of containers per year. In addition, with the expansion of Chittagong Port and the attraction of private companies to the export processing zones, demand for transportation on this section was expected to increase further⁸. On the other hand, most of the facilities and equipment had been developed during the British colonial period, which lasted until 1947, and there had been virtually no new investment in the railway sector since independence. Furthermore, the railway facilities and equipment were aging, making it difficult at the time to meet demand in terms of both quantity and quality, thus potentially becoming a bottleneck for economic development.

Even at the time of the ex-post evaluation, Bangladesh's GDP growth rate was above 7% per year on average⁹, and the volume of BR's passenger and cargo traffic was on an upward trend, as shown in the table below. BR's freight volumes between the Inland Container Depot (ICD) in Dhaka, where transported containers are temporarily stored, and Chittagong Port, have also been increasing in recent years (see Table 1) and have increased significantly compared to the pre-project period (573,903 tons in 2006/7), thus confirming the importance of the section of the railway network covered by the project.

Table 1 Trends in Passenger and Freight Traffic According to BR

		2015/16	2016/17	2017/18
All of BR	Volume of Transportation (Million passenger/Km)	9,167	10,041	12,994
	Freight Tonnes Carried (Thousand Tonnes)	2,486	3,877	4,555
ICD (Dhaka)- Chittagong Port	Freight Tonnes Carried (Thousand Tonnes)	603	577	767

Source: BR, *Information Book 2018*, Chittagong Port Authority website (<http://cpa.gov.bd/>)

While passenger and freight traffic has been on the rise, the aging railway facilities and equipment in Bangladesh noted above remain as one of the challenges in the railway sector, both at the time of the appraisal and at the time of ex-post evaluation, thus there continues to be a strong need for the development of facilities and equipment in the railway sector.

⁷ Abbreviation for Twenty Foot Equivalent Units, a unit of measurement for the number of containers in 20 feet.

⁸ Source: Document provided by JICA

⁹ Source: WB, *World Development Indicator*. GDP growth rate of Bangladesh was on average 7.1% in 2016, 7.3% in 2017, and 7.9% in 2018.

3.1.3 Consistency with Japan's ODA Policy

The *Country Assistance Policy for Bangladesh* (2006) at the time of the appraisal stated the importance of providing infrastructure related to transport to realize the sustainable economic growth needed to support poverty reduction. In the *Strategy for Overseas Economic Cooperation Operations* (FY2005-2007), support for the development of basic economic infrastructure to promote economic growth was designated as a priority area for assistance to Bangladesh. Furthermore, the *Country Assistance Strategy for Bangladesh* (2006) indicated that Japan would support the development of the railway network while encouraging reform of BR in cooperation with the Asian Development Bank (ADB) and the World Bank (WB). Hence, the objective of the project is in line with Japan's assistance policy.

3.1.4 Appropriateness of the Project Plan and Approach

The expansion and improvement of the Pahartali workshop was removed from the scope of the project during the implementation of the project¹⁰. This change was made in order to avoid unnecessarily extending the project period and in consideration of the cost of the project after several unsuccessful bids which took longer than expected. Furthermore, while this was the first JICA project for BR, the broad scope of the project was seen as an impediment to operate and manage the project, including the bidding process. The project scope was reviewed during implementation of the project and it was agreed among the parties concerned that the focus should be on track doubling, thus leading to the determination that it would be appropriate to change the scope of the project such that work related to the Pahartali workshop would be implemented as a separate project at the expense of the counterparty government.

In light of the above, this project has been highly relevant to Bangladesh's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ①)

3.2.1 Project Outputs

The planned major outputs of the project consisted of the track doubling of the Laksam-Chinkiaastana section, expansion and improvement of the Pahartali workshop, remodelling of the Chittagong station yard, procurement of locomotives and provision of consulting services. The major planned and actual outputs are shown in Table 2.

¹⁰ This scope was subsequently implemented with funding from the Government of Bangladesh and a grant for debt relief (DRGF) from Japan, and completed in 2019.

Table 2 Planned and Actual Output

	Unit	Plan	Actual
1. Track Doubling between Laksam and Chinkiasana			
1-1. Track Doubling of the Target Section	Km	61	As Planned
1-2. Remodelling of Track Layout and Provision of Station Facilities	No. of Station	11	As Planned
1-3. Construction of the Related Facilities	No.	5	8
Bridge	No.	11	As Planned
Pipe Culvert	No.	19	34
1-4. Expansion of Crossing	No.	13	As Planned
1-5. Installation and Expansion of Signalling and Telecommunication System	No.	11	As Planned
2. Expansion and Improvement of Pahartali Workshop	-	-	Out of Scope (Implemented as Separate Project)
3. Chittagong Station Yard Modelling			
3-1. Loop Track	No.	3	As Planned
Platform	No.	1	
3-2. Installation of Water Supply and Drainage system	-	-	
3-3. Renovation and Construction of Offices	-	-	
3-4. Replacement of Tracks and Turnouts in the Station Yard	-	-	
3-5. Restoration of Track and Bridge on the Section between Chittagong Marshalling Yard and Pahartali Station	-	-	
4. Procurement of Locomotives	No.	11	As Planned ^{Note}
5. Consulting Service			
5-1. Follow Up on Detailed Design, Tendering, Construction Supervision, Disburse Management, Project Progress Supervision, etc.	-	-	Items written in left column were implemented as planned. Support for evaluation of the tendering was added.
5-2. Technical Assistance (Skill Development Program for Marketing Department and Maintenance Department)	-	-	

Source: Document provided by JICA, questionnaire answers from BR

Note: Though number of locomotives procured was as planned, the specification of the locomotive was changed. The detail is noted below.

As shown in Table 2, changes in the major outputs included removing expansion and improvement of the Pahartali workshop from the scope of the project, increasing the number of related facilities (bridges and culverts) to be constructed, changing the specifications of the procured locomotives, and adding support for evaluating bids as a consulting service. The details of the changes and the reasons therefor are as follows.

[Changes in the major outputs and the reasons therefor]

- ① Increase in the number of bridges and culverts constructed for the target section (track doubling between Laksam and Chinkiasana)

Reason: Since some of the bridges and culverts in the section were antiquated and had axle loads lower than those stipulated by regulations at the time, a decision was made to rebuild them in accordance with the design of the double track system. Increasing the number of bridges and culverts was necessary to ensure the safety of the railway service in the newly double tracked section, and is thus deemed to be an appropriate change.

② Cancellation of expansion and improvement of the Pahartali workshop

Reason: The reason for this was that although bidding was held twice, none of the bidders had sufficient technical skills and thus none of them were selected. As a result, due to the increased cost of other work under the scope of the project, this workshop-related work was implemented under a separate project¹¹ with Bangladesh's own budget and a grant for debt relief (DRGF) from Japan¹².

③ Changes in the specifications of the procured locomotives

Reason: Although there was no change in the number of locomotives procured, the maximum axle load was changed from 11.75 to 11.96 tons. At the time of the appraisal, it was decided that the locomotive specifications would be re-examined based on an analysis of future demand, thus this change is not deemed to be an issue.

④ Addition of support for evaluating bids as a consulting service

Reason: Support for evaluating bids was added to the planned provision of consulting services. Since this was the first JICA-supported project for BR and the project components were complicating, BR requested support for evaluating bids. This addition is deemed to be appropriate as both BR and JICA agreed that the addition was necessary.



Roadbed Developed through the Project



A Signal Installed through the Project

¹¹ According to BR, this project was completed in December 2019.

¹² Source: Document provided by JICA and interview with BR

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost was 33,213 million yen, significantly higher than the originally planned cost of 20,811 million yen (160% of the original plan). As shown in Table 3, the portion covered by the Japanese side was within the plan, while that covered by the Bangladesh side increased substantially.

Table 3 Planned and Actual Project Cost

(Unit: Million Yen)

	Plan			Actual		
	Total	Japanese Portion	Bangladesh Portion	Total	Japanese Portion	Bangladesh Portion
Track Doubling between Laksam and Chinkiasana	6,601	3,497	3,104	15,347	6,538	8,809
Expansion and Improvement of Pahartali Workshop	1,839	1,839	0	0	0	0
Remodelling of Chittagong Station Yard	858	858	0	1,975	480	1,495
Rolling Stock Procurement	3,794	3,794	0	5,370	4,174	1,196
Consulting Service	1,738	1,738	0	1,687	1,687	0
Land Acquisition and Compensation	75	0	75	35	0	35
Administration Cost	129	0	129	178	0	178
Tax	4,428	0	4,428	4,142	0	4,142
Price Escalation	574	574	0	4,479	0	4,479
Contingency	774	616	158	0	0	0
Total	20,810	12,916	7,894	33,213	12,879	20,334

Source: Document provided by JICA, questionnaire answers from BR

Note: Exchange rate Plan: 1 Bangladesh Taka (1 BDT) = 1.66 yen, Actual: 1 BDT = 1.34 yen, Average rate by International Financial Statistics of IMF during the project implementing period.

The main reasons why the project cost was significantly higher than planned were changes in the scope of the project, increases in prices and exchange rate fluctuations¹³. As previously explained, the expansion and improvement of the Pahartali workshop was removed from the scope of the project due to repeated unsuccessful bids and the impact that this had on the project period and the difficulty in selecting appropriate contractors. On the other hand, with regards to the track doubling of the Laksam-Chinkiasana section, which was the main output of the project, adding the objective of strengthening the bridges and culverts required for safe operations and changing locomotive specifications resulted in an increase in project costs. In addition, while the Bangladesh side prepared its Development Project Proposal (DPP) in 2005, the actual changes in prices were larger than expected at the time and it was

¹³ The exchange rate was 1 BDT = 1.66 yen when the Bangladesh side prepared the DPP. However, the yen continued to appreciate since then, reaching 0.97 yen to 1 BDT in 2012 during the implementation of the project, and 1 BDT to 1.39 yen in 2017 when the project was completed.

needed to examine the estimate cost and revise the DPP to reflect the actual situation, and in turn, affected by the increase in project costs¹⁴.

3.2.2.2 Project Period

The project period¹⁵ was planned to be 92 months as opposed to an actual 109 months, from December 2007 to December 2016, which was longer than planned (118% of the plan). The main reasons for the longer project period were the procedures required for the change of scope related to track doubling, longer time required for bidding preparations, and nationwide demonstrations led by the opposition party during the construction period which halted work for nearly two months. In addition, for the tendering process for locomotive procurement and the expansion and improvement of the Pahartali workshop, there were no bidders who met the technical requirements, thus the re-tendering process was repeatedly implemented, and it took time to prepare the documents each time, which also contributed to the delay. Further, this project was the first JICA-supported project for BR, and the project, which had many components, was complicating for BR and the bidders, which made it difficult to revise the scope of the project and implement the re-tendering process.

Table 4 Planned and Actual Project Period

	Plan (As of the appraisal)	Actual
L/A	November 2007	December 2007
Track Doubling between Laksam and Chinkiastana	January 2008-July 2013	July 2009-March 2015
Expansion and Improvement of Pahartali Workshop	April 2007-February 2010	-
Remodelling of Chittagong Station Yard	September 2008-May 2012	July 2009-May 2015
Rolling Stock Procurement	April 2007-February 2010	May 2011-December 2013
Consulting Services	April 2007-December 2012	May 2009-December 2014
Project Completion (Project Period)	December 2007-July 2015 (92 months)	December 2007-December 2016 (109 months)

Source: Document provided by JICA, questionnaire answers from BR

3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

At the time of the appraisal of the project, the Financial Internal Rate of Return (FIRR) was calculated as 2%, with passenger and freight revenues set as the benefit, project cost and operation and maintenance costs set as the cost, and a project life of 25 years. The Economic Internal Rate of Return (EIRR) was calculated as 9%, with time savings, increase in GDP,

¹⁴ For example, the lowest price in the bid for locomotive procurement was 49% above the estimated amount.

¹⁵ The project period is defined as the period from the month in which the L/A is signed to the month in which the defect liability period ends. (The warranty period was two years after the procurement of equipment, one year after the completion of construction and two years after the procurement of signaling equipment.)

savings on vehicle purchasing costs, and savings on locomotive purchasing costs set as the benefit, project cost and operation and maintenance costs set as the cost, and a project life of 25 years as well. However, the disbursement of the project funds differed significantly from the original plan and assumptions due to the change in the scope of the project. Furthermore, due to the fact that data for each scope needed for quantitative analysis was not available, it was not possible to recalculate the internal rate of return.

As described above, the project cost significantly exceeded the plan and project period also exceeded the plan. Therefore, efficiency of the project is low.

3.3 Effectiveness and Impacts¹⁶ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Table 5 summarizes the actual data since the year of project completion for each of the operation and effect indicators established at the time of the appraisal of the project. In addition to the operation and effect indicators, the “travel times on the target sections” and “number of accidents” are provided in Tables 6 and 7, respectively, as reference indicators to supplement improvements in train speed and safety.

¹⁶ Sub-rating for Effectiveness is to be put with consideration of Impacts.

Table 5 Operation and Effect Indicators of the Project

	Baseline	Target	Actual		
	2005	2016	2016/17	2017/18	2018/19
		1 Year After Completion	Completion Year	1 Year After Completion	2 Years After Completion
Number of Passengers at Station on the Project Section (person/day)	5,440	15,600	12,345	13,700	13,655
Container Traffic Handling (1,000 TEU/year)	53,899 ^{Note1}	229,028 ^{Note1}	72,998	74,741	88,850
Number of Trains Running (Average per Day, Up & Down)	38	65	58	58	60
Operating Rate of Locomotives (%)	-	86	N.A.	N.A.	86
Pahartali Workshop Productivity ^{Note2}					
Diesel (Unit/Month)	3.0	4.0	N.A.	N.A.	N.A.
Coaches (Unit/Day)	2.4	3.5	2.6	2.9	3.4
Wagons (Unit/Day)	5.0	7.5	3.7	2.9	2.2
Train Speed (Km/h)					
Passenger	55	80	72	80	80
Freight	31	60	45	45	45
Operation punctuality (%)					
Intercity train	72	95	94	94	92
Local train	59	85	94	94	93

Source: Document provided by JICA, questionnaire answers from BR

Note 1: Since the baseline data provided by BR at the time of the ex-post evaluation was different from that at the time of the appraisal, the data provided at the time of the ex-post evaluation was used as the revised baseline data to maintain consistency, and the target was also re-set to match the conditions at the time of the appraisal (the target was 4.25 times the baseline).

Note 2: As the improvement of the Pahartali workshop was carried out under a separate project, this data is for reference only.

The targets for the operation and effect indicators set at the time of the appraisal were expected to be achieved one year after the completion of the project. As the project was completed in 2016, the achievement status of the targets is analysed based on the data as of 2017/18. Actual results were around 80% or more of targets for the number of passengers at the stations on the section covered by the project, the number of trains running, train speed, and operation punctuality. Converting the single track to a double track in the target section made it possible to increase the number of trains running and the passengers. Train speed has also increased due to improvements in track layout and the installation of signalling and communication systems, and grasping the proper operations and reducing waiting times at train stations have greatly contributed to improving the operation

punctuality. In addition, though the container traffic handling did not reach the target, a certain level of effects, the increase compared to the time of the appraisal, was confirmed. This is due to the fact that some sections of the Dhaka-Chittagong line (namely, Akhaura-Laksam¹⁷) were not double-tracked. As stated in “2.3 Constraints during the Evaluation Study”, it is pointed that container traffic handling will be fully effective after the entire section has been double-tracked. With regard to the target values, although the completion of the Tongi-Bailab Bazaar section was a precondition for the achievement of the project effects, the fact that the timing of implementation and completion of the Akhaura-Laksam section was not yet determined was not sufficiently taken into account when the target values were set, resulting in target values that may have been set too high. Furthermore, according to the Freight Forwarders Association, a lack of sufficient space near the Dhaka railway station has also affected the volume of railway container traffic on this section since containers transported to Dhaka are once stored in a depot before being transported to their various destinations.

Table 6 Travel Times on the Target Sections

Section	Name of Train	Before the Project	After the Project
Laksam-Chinkiasana	Subarno	1 Hour and 12 Minutes	50 Minutes
	Karnofully Exp.	1 Hour and 33 Minutes	1 Hour and 22 Minutes
Dhaka-Chittagong	Subarno	7 Hours and 5 Minutes	5 Hours and 10 Minutes
	Karnofully Exp.	11 Hours	9 Hours and 30 Minutes

Source: Document provided by BR

Table 7 Number of Annual Derailment Accidents involving Locomotives Running the Target Sections

Before the Project (2005)	After the Project (2016/17)	After the Project (2017/18)	After the Project (2018/19)
25 cases	3 cases	5 cases	6 cases

Source: Questionnaire answers from BR

The time required for the entire Dhaka-Chittagong section and the section covered by the project declined after completion of the project, as shown in Table 6. This was mainly due to improved speed resulting from track doubling and related facilities, the expansion of station platforms, and the efficient operation of trains through improvements to the loop track. In addition, the number of derailment accidents is also lower than before the project implementation through improvements to the track (see Table 7). The data in Table 7 shows the number of derailment accidents on the line involving the target section, Laksam-Chinkiasana¹⁸. Out of 25 cases before the project, the number of derailment accidents that occurred in the targeted section is unknown, thus an accurate comparison

¹⁷ ADB is supporting track doubling of this section (scheduled for completion in 2022).

¹⁸ The line of the target section (Laksam-Chinkiasana) connect Chittagong to Sylhet and Chandpur areas, which is not included in the targeted area, in addition to Dhaka.

cannot be made. According to the department in charge of the operation and management of the target section, however, no derailment accidents, which were frequently observed before the project, have occurred in the target section since the project was implemented. Under this project, along with track doubling, track improvements and the installation of signalling and communication systems have allowed for IT to be leveraged to automate those systems, and the enhanced accuracy with which operations can now be monitored has contributed to more stable operations and fewer accidents.

3.3.1.2 Qualitative Effects (Other Effects)

The qualitative effect of the project was expected as improvement in the convenience of railway services, such as safety and punctuality. This can be confirmed through the quantitative effects described above, such as an increase in the number of trains running, a reduction in travel times, punctuality, and the number of accidents. To procure information to supplement these quantitative effects, interviews with passengers using the railway were conducted at stations on the target section visited during the site inspection as part of this evaluation¹⁹. In interviews, passengers also commented on the increase in the number of trains running and the reduction in travel time and waiting time, confirming the quantitative effects of the study. In addition, improvement of comfort at the stations was identified as a result of rehabilitating the Chittagong station yard. For example, the construction of platforms with roofs has provided passengers with a shelter from rain when they wait for the train, and the installation of crosswalks across platforms has enabled passengers and people living in the area to safely cross the tracks. Responses to interviews also indicate that the installation of public toilets and the like has improved the station environment, and the installation of drainage systems has resulted in less flooding of stations and tracks when it rains, thus improving sanitation during rainfall.

Furthermore, according to interviews with the Freight Forwarders Association, track doubling and the development of related facilities and equipment in the target sections has resulted in punctuality and reduced damage to goods caused by shaking and a greater number of trains running. However, for companies involved in transporting freight, the section is still considered to be under construction as track doubling has not been completed for the entire Dhaka-Chittagong section, despite double tracking being completed for the section covered by the project. Since major cargo is transported from Chittagong to Dhaka, the entire section needs to be double-tracked to accurately understand the extent to which railway convenience has increased in terms of freight transport.

¹⁹ Interviews with passengers waiting for trains at stations during the site inspection. A total of 18 people (14 males and four females) were interviewed, six at Chittagong station and three each at Laksam, Gunaboti, Fenin and Chinkiaastana stations.

3.3.2 Impacts

3.3.2.1 Intended Impacts

(1) Contribution to strengthening the economic infrastructure

As explained in Effectiveness, the number of passengers increased alongside an increase in the number of trains running, and container traffic handling also increased after the project was implemented, although it did not reach the target (see Table 8). The project is considered to have indirectly contributed to strengthening the economic base of the country by improving railway services, as evidenced by recent year-on-year growth in the volume of containers handled at Chittagong Port, which is the origin and terminus of freight traffic between Dhaka and Chittagong.

Table 8 Volume of Container Handling at Chittagong Port

(Unit: TEU)

2014/15	2015/16	2016/17	2017/18	2018/19
1,867,062	2,189,439	2,419,481	2,705,090	2,808,499

Source: Chittagong Port Authority website (<http://cpa.gov.bd/>)

In interviews conducted during the site inspection, persons working at shops located near the stations covered by the project mentioned that sales have increased in line with the increase in the number of passengers at stations. It has been confirmed that the number of customers and sales of shops around the stations have increased and that the use of railways has increased compared to at the time of the appraisal, thus contributing, to a certain extent, to the strengthening of railway services as a foundation for the economy. Considering that track doubling of the entire Dhaka-Chittagong section has not been completed as noted in Effectiveness, the contribution of the project to strengthening the economic base of the target area is expected to be enhanced after the track doubling of the entire section is completed in the future.

(2) Improving the environment through the development of railway facilities

The document at the time of the appraisal indicated that there were expectations for a modal shift from road to rail transport and an associated reduction in CO₂ emissions. However, improvement in the environment was not assumed by the executing agency to be an impact of the project at the time of the appraisal and during implementation, and if such an impact was to occur, it would be negligible. In addition, although the Freight Forwarders Associations and passengers were asked in interviews about the effect of the project on the environment, sufficient information could not be obtained to analyse this effect as it was not recognized by persons that were interviewed²⁰.

²⁰ Source: BR, interviews with Freight Forwarders Association and railway users

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

In accordance with *JBIC Guidelines for Confirmation of Environmental and Social Considerations* (April 2002), the project falls into Environmental Category B, indicating that the undesirable effects of the project on the environment are not significant. As such, although preparation of an environmental impact assessment was not mandatory, a simplified environmental impact assessment was conducted and approved in 2007. In addition, the contractor submitted an environmental management plan and implementation schedule, and monitored air, water quality, noise, and waste during construction. Monthly reports were also prepared and submitted, and no particular issues were reported²¹.

(2) Resettlement and Land Acquisition

The land utilized for the project was owned by BR and no land acquisitions occurred. However, as a result of track doubling, 11 unauthorized households, 110 shops (including 106 unauthorized shops), one unauthorized office, four unauthorized mosques, and one unauthorized market were resettled. Upon resettlement, the amount of compensation was determined at the land level in each area and procedures were carried out according to the Resettlement Action Plan with the prior consent of the aforementioned resettled parties. In addition, a Complaint Redress Committee was formed as part of the resettlement, and no complaints were received²².

(3) Other Impacts

As part of the consulting services, plans were made to conduct education and awareness activities on HIV/AIDS prevention for construction workers involved in the project. The HIV and AIDS prevention program was implemented by a major NGO in Bangladesh as planned, and the activities were monitored by a consultant. Specifically, HIV/AIDS sessions were conducted for workers, leaflets and condoms were distributed, and information sessions were held for local communities. The initiative was proposed by JICA and was the first case of its kind for BR. Since the implementation of the project, BR has carried out similar activities in all projects involving construction²³.

In light of the above, this project has mostly achieved its objectives. Therefore, effectiveness and impacts of the project are high.

²¹ Source: Documents provided by JICA and BR

²² Source: Document provided by JICA, questionnaire answers from BR

²³ Source: Interview with BR

3.4 Sustainability (Rating: ②)

3.4.1 Institutional/Organizational Aspect of Operation and Maintenance

Operation and maintenance of the constructed and refurbished facilities are carried out by BR. BR is divided into two zones, the East Zone and the West Zone, and each of the departments responsible for maintenance related to the project are part of the East Zone, including departments providing maintenance for tracks, bridges, equipment and locomotives. At the time of the ex-post evaluation, the total number of staff at BR was 25,823 (in 2017/2018). However, BR staff mentioned that the planned number of required staff was 40,000²⁴. Meanwhile, BR, with the support of ADB, has been undergoing organizational reform for improving the efficiency whereby it has been reducing the number of employees with the aim of greater organizational strength by reorganizing, scaling back unprofitable departments, and outsourcing some operations such as ticket booking to private companies²⁵. Though there may be a difference in opinion between on-site employees and management about the number of personnel²⁶, understaffing is considered for some operations. For example, at the time of the appraisal, it was noted that additional maintenance personnel would be needed, particularly for the maintenance of the double-track project. However, at the time of ex-post evaluation, the staff responsible for the maintenance of the single track is also responsible for the one of the double track. In addition, three of the 11 train stations developed under the project have been closed due to insufficient manpower. This factor impedes proper operation and maintenance of the facilities that were developed and is identified as a challenge in terms of institutional and organizational aspects.

3.4.2 Technical Aspect of Operation and Maintenance

The executing agency, BR, had experience in implementing a number of donor-supported projects, and it was noted in the documentation at the time of the appraisal that there were no issues related to the agency's technical capacity in terms of basic operations and maintenance. In fact, interviews with BR staff revealed that they have the technical capacity to carry out single and double track operations and maintenance activities. During the implementation of the project, training on the operation and maintenance of newly installed equipment and locomotives was conducted, and participants of the trainings have shared the knowledge and experience gained within BR after the completion of the project. Therefore, BR has basic technical capacity and there are no facilities or equipment that are not operational due to a lack

²⁴ Source: BR, *Information Book 2018* and interview with BR

²⁵ The total number of BR staff, which was 34,168 in 2006, was reduced by more than 20% to 25,823 in 2018. ADB's program positions headcount reduction as an improvement in BR's productivity and efficiency.

²⁶ There were plans to confirm with management during the second field survey the inadequate number of personnel identified at the time of the ex-post evaluation and the status of personnel reductions due to organizational restructuring. However, it was not possible to confirm the information in detail since the evaluators could not conduct the second field survey due to the impact of COVID-19 and restrictions on meetings and interviews within Bangladesh.

of operational and maintenance capacity. Although ongoing operation and maintenance training is needed for staff in charge of the communications system installed under the project, there is no set training system within the organization, and there are limited opportunities for staff to improve their technical capabilities related to operation and maintenance. Accordingly, there was a minor concern about operations and maintenance techniques at the time of the ex-post evaluation. Although training was provided under the project to strengthen the capacity of the marketing department, the department was unable to coordinate the schedule with the relevant participants, and as such the effect and impact of the training on the sustainability of the project could not be determined.

3.4.3 Financial Aspect of Operation and Maintenance

Maintenance costs accounted for about 30% of BR's expenditures (see Table 9) and, according to BR staff, although the maintenance budget is not adequate, they have conducted maintenance to the extent possible within the budget. BR has been operating at a loss for many years, reporting a loss of 14,318 million BDT (approximately 17,942 million yen) in FY2017/18. In Bangladesh, railways are heavily used by low-income groups, and fares are kept low as a Public Service Obligation (PSO). Although BR has received compensation for the amount related to this PSO from the government in line with government policy, the amount has been fixed since 1997 (see Table 10) due to financial difficulties experienced by the government, which has also led to a growing deficit. In addition, fares have remained unchanged at BR since 1992. Although fares were raised in 2012 for the first time in a decade, indicating an improvement in the revenue to expense ratio, this has since been offset by staff wage increases. Some improvement was seen when fares were once again raised in 2016, and ADB, which has supported BR reform, noted the need to continue to set appropriate fares. Although there were discussions at BR in 2020 about raising fares, the prospects for this are not yet known, due in part to COVID-19.

Table 9 BR's Expenditures

(Unit: Million BDT)					
	General Admin.	Repair & Maintenance	Staff Salaries	Others	Miscellaneous Expenses
2015/16	3,564	7,169	1,269	1,737	4,931
2016/17	4,074	8,552	1,383	2,189	8,157
2017/18	3,981	9,931	1,309	2,102	7,755

Source: BR, *Information Book 2018*

Table 10 Revenue to Expense Ratio

(Unit: Million BDT)

	PSO Compensation	Welfare Grant	Operating Revenue	Operating Expenses	Revenue to Expense Ratio (%)
2011/12	860	370	7,264	15,671	215.7
2012/13	860	390	9,293	15,624	168.1
2013/14	860	359	9,220	16,017	173.7
2014/15	860	394	10,608	18,083	170.5
2015/16	860	372	10,272	22,292	217.0
2016/17	860	553	14,451	28,355	196.2
2017/18	860	656	16,378	29,180	178.2

Source: BR, *Information Book 2018*

As noted above, while the financial deficit continues, in terms of its budget, BR's budgetary requests to the government have been fulfilled nearly in full during the last five years (see Table 11), and BR's budget plan is positively evaluated by the government to some extent.

Table 11 Budget Allocation from the Government to BR

	Requested Amount (Million BDT)	Allocated Amount (Million BDT)	Allocation Ratio (%)
2014/15	11,715	11,673	99%
2015/16	13,045	12,482	96%
2016/17	15,830	15,710	99%
2017/18	31,655	31,655	100%
2018/19	36,000	34,638	96%

Source: Documents provided by BR and JICA

3.4.4 Status of Operation and Maintenance

In terms of facilities and equipment maintained under the project, it was confirmed through interviews and inspections during the site visit that the double tracked layout, bridges and culverts, related facilities such as level crossings and signalling and communication systems, loop start-up at Chittagong station, platforms, drainage systems, offices, tracks and turnouts, and locomotive maintenance, are in good condition and operating without issue except for at three of the 11 stations developed that are now closed.

Maintenance of facilities is generally carried out in accordance with provisions set forth by BR. For roadbeds and tracks, BR adds ballast²⁷ generally every five years, and regularly conducts adjusting them, weeding, and checking of bolts and tracks. In addition, BR assigns an average of one person per kilometre of double tracked sections to carry out regular inspections. Cleaning and inspection of station buildings and related facilities are also

²⁷ Gravel for paving railway tracks, roads, etc.

conducted on a regular basis. Locomotives also undergo daily inspections (inspection and replacement of consumables, etc.) and periodic inspections (checking the inside of engines, checking the condition of engines, including cylinders and accessories, replacing spare parts as planned, etc.) according to a set schedule. As noted above, at the time of the ex-post evaluation, three stations are not utilized, accordingly the communication and signal systems in the vicinity of those stations were also found to be underutilized, mainly due to staff shortages.

In light of the above, some minor problems have been observed in terms of the institutional/organizational aspect, technical aspect, financial aspect, current status. Therefore, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Under this project, part of the Dhaka-Chittagong Railway line was doubled, the Chittagong station yard was rehabilitated, and locomotives were procured with the aim of enhancing the transportation capacity and improving the quality of service of the Dhaka-Chittagong Railway. This project, under which the railway network and the transportation services of an important section in Bangladesh were improved, is consistent with Bangladesh's development policy and development needs at the time of both project appraisal and the ex-post evaluation, and is also consistent with Japan's assistance policy. Therefore, the relevance of the project is high. In terms of project implementation, the project period exceeded the plan due to unsuccessful bidding and changes in project scope. Also, the project cost largely exceeded the plan due to fluctuations in exchange rates and increases in prices in addition to scope changes and the prolonged project period. Thus, efficiency of the project is low. Regarding the project effects, a certain increase in container traffic handling has been observed though it did not reach the target figures since the project only covered part of the section and since track doubling for the entire section has not been completed. Furthermore, the degree to which operation and effect indicators set at the time of project appraisal were achieved was high, except for container traffic handling, and the convenience of railway services resulting from increasing the number of services and improving punctuality was also confirmed through interviews with railway users, thus indicating that the project has made a significant contribution to improving the quality of railway services. Therefore, effectiveness and impacts of the project are high. As for operation and maintenance, minor problems have been observed in terms of institutional/organizational, technical, and financial aspects, as well as the current status. Therefore, sustainability of the project effects is fair.

In light of the above, this project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

• Consideration of assigning an appropriate number of staff (review of the possibility of staffing closed stations for their use)

At the time of the ex-post evaluation, three stations had been closed since construction mainly due to staff shortages. There continues to be a situation where persons in charge of single track operations and maintenance are also in charge of that for double tracked sections. Staff shortages are a common problem across the public sector in Bangladesh and are unlikely to be resolved any time soon. Further, considering that personnel reductions have been promoted as part of organizational reforms, it is recommended that the department in charge of operations and maintenance for each facility and set of equipment assess the exact number of personnel needed, share this information within the organization, and discuss how to secure personnel so that the facilities developed under the project can be properly utilized.

• Taking initiatives to set appropriate fares to improve the deficit

BR has been operating at a loss since the time of the appraisal. This is due in part to low fares and the fact that PSO compensation amounts are set on a fixed basis rather than taking into account factors such as inflation. Going forward, BR will need to discuss appropriate PSO compensation amounts and fare pricing, and consider realistic plans to improve the situation.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

• Project formation where the executing agency does not have sufficient experience

This was the first JICA project for BR, the executing agency of the project. On the other hand, the project was a complicating undertaking with a wide scope to be covered, including track improvements, construction of station facilities, construction of bridges and other related facilities, track doubling including installation of signalling and communication systems, expansion and rehabilitation of a workshop, rehabilitation of a station yard, and procurement of locomotives. This made it difficult for the project to proceed smoothly, as was seen by, for example, repeated unsuccessful bids. For projects such as this one where the executing agency has little or no experience with JICA projects, it is necessary to examine whether the project is too complicating and whether the capacity of the executing agency (staff and implementation capacity) is sufficient. In doing so, it is desirable to examine the project plan that takes into account the burden on the executing agency, such as dividing the project into multiple phases when multiple components are included, or providing the necessary support when the executing agency does not have sufficient capacity to operate and manage the project.

· Setting of indicators for the project that supports a part of the target area or scope

The container traffic handling, an operation and effect indicator of this project, did not reach the target, where the way of setting the target can be raised as the main reason. This project supported the track doubling of a part (Laksam-Chinkiasana) of the most important line (Dhaka-Chittagong section) in Bangladesh. On the other hand, it was considered that the target was set on the assumption that the entire Dhaka-Chittagong section would be double-tracked. However, at the time of ex-post evaluation, some sections other than the target section of the project in the Dhaka-Chittagong were not double-tracked. Accordingly, the container traffic handling, mainly intended to be transported on the Dhaka-Chittagong section, did not achieve the target though a certain effect was confirmed. In the case of the project that supports a part of the target area or scope of the project, the persons involved in the project planning need to set the target after clarifying the scope of effects that will be generated by the implementation of the project in order to accurately understand the project effects. If external factors beyond the scope of the project support are involved in generating effects, it is desirable to set targets that also take into account the effects of these factors, and to provide sufficient explanations of the conditions that were assumed, so that the project effects can be more accurately understood.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
① Outputs	<p>1) Track Doubling between Laksam and Chinkiastana</p> <ul style="list-style-type: none"> • Track Doubling of the Target Section: 61 km • Remodeling of Track Layout and Provision of Station Facilities: 11 Stations • Construction of the Related Facilities <ul style="list-style-type: none"> Bridges: 5 Pipe Culverts: 11 Box Culverts: 19 • Expansion of Crossing: 14 Places • Installation and Expansion of Signaling and Telecommunication System: 11 Stations <p>2) Expansion and Improvement of Pahartali Workshop</p> <p>3) Chittagong Station Yard Modelling</p> <ul style="list-style-type: none"> • Loop Tracks: 3 Places • Plat Form: 1 Place • Installation of Water Supply and Drainage System • Renovation and Construction of Offices • Replacement of Tracks and Turnouts in the Station Yard • Restoration of Track and Bridge on the Section between Chittagong Marshalling Yard and Pahartali Station <p>4) Procurement of Locomotive: 11 locomotives</p> <p>5) Consulting Service</p> <ul style="list-style-type: none"> • Follow Up on Detailed Design, Tendering, Construction Supervision, Disburse Management, Project Progress Supervision, etc. • Technical Assistance <ul style="list-style-type: none"> - Skill Development Program for Marketing Department - Skill Development Program for Maintenance Department 	<p>1) Track Doubling between Laksam and Chinkiastana</p> <p>→ As Planned</p> <p>→ As Planned</p> <p>→ 8 Bridges</p> <p>Pipe Culverts: As planned,</p> <p>Box Culverts: 34</p> <p>→ As Planned</p> <p>→ As Planned</p> <p>2) Out of Scope</p> <p>3) Chittagong Station Yard Modelling</p> <p>All Item: As planned</p> <p>4) Procurement of Locomotive: As Planned</p> <p>5) Consulting Service</p> <p>Support for Evaluation of the Tendering was Added. Other Than That, as Planned.</p>
② Project Period	November 2007-July 2015 (93 Months)	December 2007-December 2016 (109 Months)
③ Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total ODA Loan Portion Exchange Rate	<p>11,701 Million Yen</p> <p>9,740 Million Yen</p> <p>(5,867 Million BDT)</p> <p>23,032 Million Yen</p> <p>12,887 Million Yen</p> <p>1 BDT = 1.66 Yen (As of September 2006)</p>	<p>9,661 Million Yen</p> <p>23,551 Million Yen</p> <p>(17,611 Million BDT)</p> <p>33,213 Million Yen</p> <p>12,879 Million Yen</p> <p>1 BDT = 1.34 Yen (Average between December 2007 and December 2016: Source: International Financial Statistics Data of IMF)</p>
④ Final Disbursement	March 2017	