

Indonesia

Ex-Post Evaluation of Japanese ODA Loan Project
Railway Double Tracking on Java South Line (1) (2)

External Evaluator: Takako Haraguchi, International Development Associates

0. Summary

The double tracking on the Kutoarjo – Yogyakarta section on Java South Line is relevant to both policy priority and railway transportation demand. Although efficiency of the project implementation was fair due to delays in tender, high effectiveness is shown in such evidence as the increased number of trains and transportation volume compared to those with single track as well as the shortening of waiting time. As a consequence, access to Yogyakarta was improved. The status of operation and maintenance of the facilities developed by the project is good, and thus sustainability is high. In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Location



Commuter train running
on the new track and steel bridge

1.1 Background

Railways in Indonesia are located in the islands of Java and Sumatera. The total railway length is 6,441km of which 4,500km is in Java. Among the three major lines in the islands of Java, namely North Line, South Line and Bandung Line, South Line is a 828km line connecting Jakarta (the capital city) and Surabaya (the second largest city of the country) via Yogyakarta and Solo. At Cirebon station, South Line is branched to the south from North Line that connects Jakarta and Surabaya northbound.

The demand for railway transport increased along with the country's socio-economic development, and double-tracking work started on some sections. However, the entire South Line remained single track, and congestion of railway traffic was increasing. In particular, the section between Kroya, where Bandung Line joins South Line, and Yogyakarta (140km) was significantly congested, and the demand was forecast to exceed the line capacity in 2004.

1.2 Project Outline

The objective of this project is to provide sufficient line capacity and reliable train operations on Java South Line, a trunk railway line to connect Jakarta (the capital city) and Surabaya (the second largest city of the country), by preparing detailed design of double tracking on the Kroya – Yogyakarta section (140km) and constructing double track on the Kutoarjo – Yogyakarta section (64km), thereby contributing to enhanced logistics and economic development of the region.



Figure 1: Railway Map of Java Island

	(1)	(2)
Loan Approved Amount / Disbursed Amount	6,013 million yen / 5,989 million yen	10,348million yen / 9,093million yen
Exchange of Notes Date/ Loan Agreement Signing Date	December 1996 / December 1996	March 2004 / March 2004
Terms and Conditions	Interest Rate: 2.7% (2.3% for consulting services) Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied	Interest Rate: 1.3% Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied
Borrower / Executing Agency(ies)	Government of Republic of Indonesia / Directorate General of Land Transportation (DGLT) (Directorate General of Railways (DGR) since August 2005), Ministry of Transport	
Final Disbursement Date	April 2006	Not closed yet (Loan Agreement Period: September 2012)
Main Contractor (Over 1 billion yen)	PT.Wijaya Karya (Indonesia) - JFE Civil Engineering (Japan) (JV)	
Main Consultant (Over 100 million yen)	PT.Dardela Yasa Guna (Indonesia) – Pacific Consultants International (Japan) – Japan Transportation Consultants (Japan) (JV)	
Feasibility Studies, etc.	“Feasibility Study for Railway Double Tracking on Java South Line (Cirebon – Kroya – Yogyakarta – Solo)”, DGLT, 1995.	

Related Projects (if any)	<p>“Java North Line Bridge Rehabilitation Project (1)(2)” (L/A signed in 1992 and 1995)</p> <p>“Construction of Railway Double Tracking of Cikampek – Cirebon (1)(2)” (L/A signed in 1994 and 1998)</p> <p>“Railway Double Tracking on Java South Line (3) (E/S)” (L/A signed in 2007)</p> <p>“Railway Double Tracking on Java South Line (3)” (L/A signed in 2008)</p>
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2. Outline of the Evaluation Study

2.1 External Evaluator

Takako Haraguchi, International Development Associates, Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: October 2010 – October 2011

Duration of the Field Study: January 30, 2011 – February 13, 2011 and April 24, 2011 – May 3, 2011

2.3 Constraints during the Evaluation Study (if any)

This ex-post evaluation was conducted before the closure of the Loan Agreement, for a certain period of time has passed since the project completion date agreed by the Indonesian side and Japan International Cooperation Agency (JICA). Therefore, expenses of the project incurred after the above-mentioned study period, if any, are outside the scope of this evaluation.

3. Results of the Evaluation (Overall Rating: A¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan of Indonesia

At the time of the project appraisal, the Sixth Five Year Development Plan (1994-1998) aimed to handle increasing railway demand by means such as track rehabilitation (840km) and construction of new track (350km) including double tracking. Also, double tracking between Kroya and Yogyakarta, including the section under this project, was one of the five most important projects among the twelve prioritized projects in the railway sector designated by National Development Planning Agency.

At the time of the ex-post evaluation, the Medium-term National Development Plan (2010-2014), the current national development plan, holds the increase of transport capacity as the objective of the infrastructure development program. The specific objectives of the railway

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

² ③: High, ② Fair, ① Low

sector include enhancing safety and reliability and expanding the railway networks by such measures as track rehabilitation (239km), restoration of abandoned track (534km), new track construction including double tracking (954km), purchase of rolling stocks, improvement of signalling systems and electrification. Also, the master plan of the railway sector (January 2010) accordingly holds optimum utilization of existing railway networks, double tracking and electrification of Java major lines and enhanced access to key industrial areas as its objectives.

3.1.2 Relevance with the Development Needs of Indonesia

The need for this project is high at the time of the project appraisal. The annual passenger growth rates of Java North and South Lines were both 6% between 1988 and 1994, and projected to be 3.8-4.3% and 3.0%, respectively, between 1996 (at appraisal) and 2011. During the same period, the freight growth rates were projected to be 4.2-6.6% on North Line and 4.1-5.6% on South Line. The line capacity between Kutoarjo and Yogyakarta was 59 trains per day at the time of the project appraisal, and was expected to become 73 trains per day when the on-going signal improvement project was completed. Compared to this, the number of trains actually operating was projected to increase from 57 trains per day in 1995 to 79 trains per day in 2006, exceeding the capacity in 2004.

However, the actual railway demand in Java up to the time of the ex-post evaluation is below the above-mentioned projection, and freight demand is even decreasing. The passenger volume sharply dropped in the early 2000s in response to the economic situation, and then increased significantly, which made the average growth rate 2.2% during 1995-2010 or 8.6% when only taking the period after 2005. According to the executing agency of this project, the freight volume decreased due to underdevelopment of freight-handling facilities, aging of rolling stock, rapid development of road networks, and emergence of low-cost air carriers³. Nevertheless, the latest demand forecast made by the project consultant and Indonesian Railways (PT KAI: PT Kereta Api Indonesia), the major operator of public railways, project a rapid increase in freight transportation in years from now due to the upward trend of distribution of goods (such as cement) and the rise in road transportation cost (such as fuel)⁴. Accordingly, PT KAI is in process of purchasing a large quantity of wagons in 2011⁵. Double tracking would become more important for ensuring punctuality of passenger transportation with increased number of

³ The freight transportation volume in Indonesia (data on Java only were not available) is increasing by all modes between 1994 and 2008: from 12.5 million tons to 38.7 million tons (threefold) on road, from 0.29 million tons to 0.87 million tons (threefold) on air, and from 16.4 million tons to 19.6 million tons (almost the same) on rail.

⁴ The railway demand on the Cirebon – Yogyakarta section (including the project section) is forecast to increase at 2.4% for passengers and 20.6% for freight every year between 2010 and 2020.

⁵ According to PT KAI, the number of “ready to use” rolling stock has decreased (wagons from 9,293 to 3,571, and locomotives from 403 to 317, both between 1996 and 2010). In 2011, however, purchase of 2,400 wagons is underway.

slow-running freight trains.

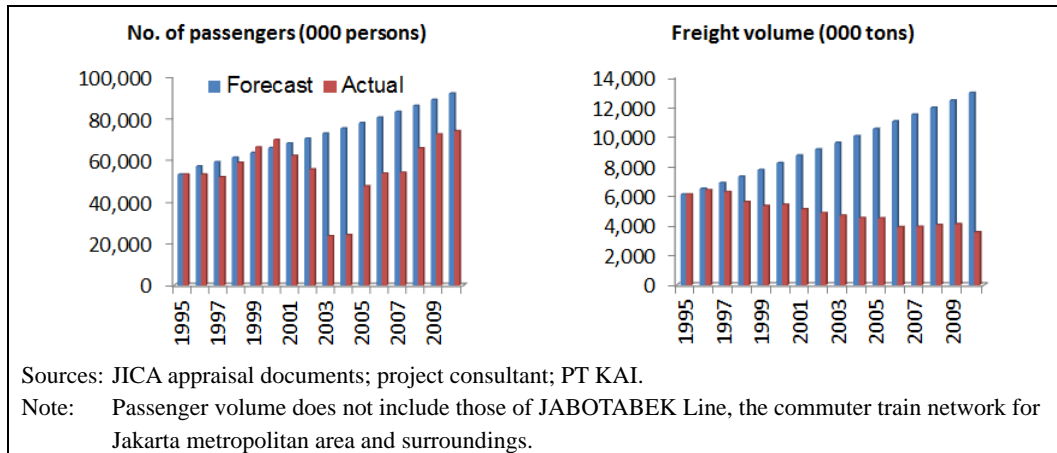


Figure 2: Railway Transportation Demand in Java Island

3.1.3 Relevance with Japan’s ODA Policy

The country assistance strategy for Indonesia (agreed in 1994) held the improvement of industrial infrastructure as one of its five priority areas, and assistance in the transportation sector was positioned in the area.

This project has been highly relevant with the country’s development plan, development needs, as well as Japan’s ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating:②)

3.2.1 Project Outputs

The planned outputs of this project, namely (i) construction of double track and (ii) consulting services, were mostly produced with some modifications and additional works such as track and bridge rehabilitation of the existing track (see *Comparison of the Original and Actual Scope of the Project* at the end of this report).

(i) The original plan of construction works consisted of the double tracking of the 64km length of section between Kutoarjo and Yogyakarta and development of the signalling system. As a result of design review, the amount was increased for embankment, excavation, siding track and turnouts, and the design of some small bridges was changed from steel bridges to box culverts. The signalling system, consisting of centralized traffic control (CTC), automatic block system, and electric interlocking system⁶ and safety facilities at level crossings), was planned to

⁶ CTC is a system to remotely control courses and operation of trains on the designated sections from the control center (located at Cirebon station). Automatic block system is to automatically control signals so that only one train can exist on a certain section. Electric interlocking system is to interlock signals and switch machines through CTC device at each station.

be installed for all of the ten stations on the section. However, due to the closure of two stations⁷, the system was installed for the remaining eight stations.

The additional works include the rehabilitation of the existing track (track, bridges and level crossings), renovation of station buildings and extension of platforms and station roofs. As the conditions of existing facilities had to be improved to ensure safe and smooth railway operation, such additional works are considered as appropriate⁸.



The existing track rehabilitated (right) and the new track



CTC equipment (the central control room at Yogyakarta Station)

(ii) The originally-planned consulting services, consisting of the detailed design of double tracking of the 140km length of section between Kroya and Yogyakarta⁹ and the tender assistance and construction supervision of the construction works between Kutoarjo and Yogyakarta, were all provided. In addition, engineering services on the rehabilitation of the existing facilities, development of design standards for track structures, supervision and assistance in hand over of the project, environmental impact assessment (EIA) on the double tracking works between Kroya and Kutoarjo, etc. These services were added to the project to implement the above-mentioned additional construction works and to improve efficiency of the

⁷ On the Kutoarjo – Yogyakarta section, Kedundang Station and Montelan Station were closed after the project because they were close to next stations and thus used by fewer passengers than other stations, and after the double tracking there was no more need for stations where trains stop to let other trains pass.

⁸ On the North Line, where double tracking works started prior to this project, rehabilitation of track and bridges had been undertaken before double tracking projects (see *Related Projects*). On the South Line, there was no such preceding project.

⁹ For the Kroya – Kutoarjo section, this project originally planned to conduct detailed design and leave the procurement and construction on subsequent ODA loan projects. However, the plan was changed to include detailed design and tender assistance in this project and to carry out construction supervision in subsequent projects. Two successive projects, “Railway Double Tracking on Java South Line (3) (E/S)” and “Railway Double Tracking on Java South Line (3)”, are currently being implemented.

subsequent projects, and thus are considered as appropriate. The work volume of the consultants increased due to the additional services and the extended implementation period (see 3.2.2.1 *Project Period*).

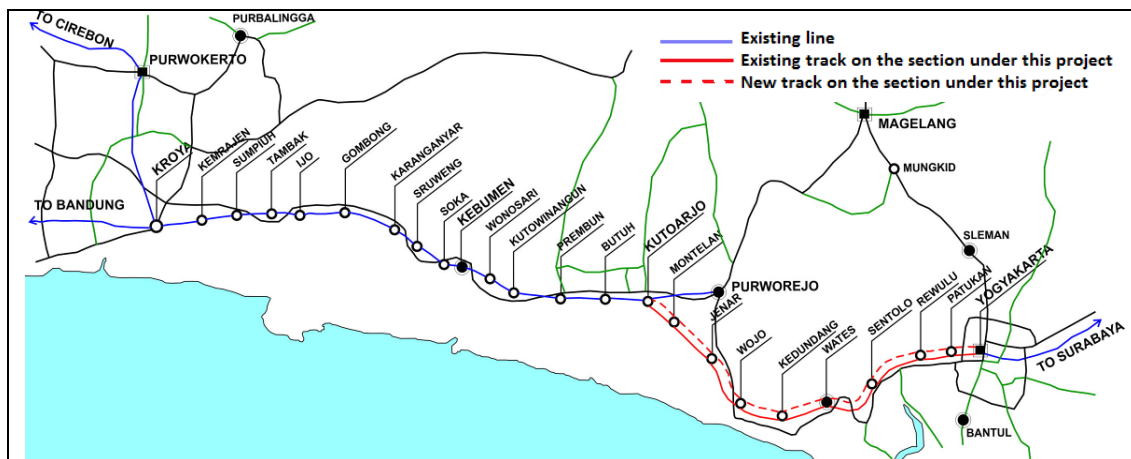


Figure 3: Map of the Section under the Project

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned total project cost estimated at the appraisal for the first loan agreement was 15,988 million yen, and the actual cost was 16,417 million yen, which was mostly as planned considering the increase of the output. The maximum amount of the Japanese ODA loan planned at the said appraisal was 11,991 million yen, and the disbursed amount, 15,062 million yen, was also slightly higher than planned, though the cost spent to produce the originally-planned output was within the plan¹⁰.

3.2.2.2 Project Period

In the appraisal for the first Loan Agreement, the project period was planned to be 84 months from October 1996 (signing on the loan agreement) to September 2003¹¹. The actual project duration, 130 months from December 1996 to September 2007, was significantly longer than planned. This was mainly because of the prolonged period for the preparation of tender documents: as against 12 months, it actually took 51 months for tender preparation, tender and contract¹².

¹⁰ Approx. 5,400 million yen was spent for the additional output.

¹¹ In this project, the project completion date was defined as the commencement date of commercial operation.

¹² The procurement for this project was planned to be in one package by international competitive bidding (ICB). However, after the conclusion of the loan agreement, the executing agency proposed to procure the signaling system in a separate package and by direct appointment. The discussion and preparation of documents related to this change took long time and delayed the

Nonetheless, the civil works portion was completed in 41 months, which was shorter than the planned 42 months. As mentioned above, this project included additional works to rehabilitate the existing track and bridges, and thus the construction schedule was highly complicated with switching of numerous processes between the existing and newly-constructing tracks while ensuring normal train operation. And yet, the construction was completed in shorter period than the plan that did not include additional works, and thus the schedule control is highly evaluated. The executing agency explains that their experience in double tracking works¹³ and the favourable weather conditions contributed to such an earlier completion.

Although the project cost was within the plan, the project period exceeded, therefore efficiency of the project is fair.

3.3 Effectiveness (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

(1) Number of trains and traffic volume

The double tracking doubled the line capacity of the project section between Kutoarjo and Yogyakarta compared to before the project (after the improvement of signals on the existing track). Accordingly, the number of passenger trains that actually operate increased after the project, and exceeded the planned level in 2010, three years after the project completion (Table 1). On the other hand, the number of freight trains largely decreased after the project, but this is considered to be due to a difference in ways of data collection between before and after the project¹⁴, besides the above-mentioned decrease in freight transportation demand and aging of wagons.

schedule. Finally, the mode of procurement and the number of package were brought back to the original plan.

¹³ The consultant for this project were involved in the track rehabilitation, bridge rehabilitation and double tracing projects for the North Line. The double tracking works on the North Line (“Construction of Railway Double Tracking of Cikampek – Cirebon (1)(2)”), which were less complicated than this project since the rehabilitation works for the existing track and bridges had been completed by preceding projects, took about the same number of months as the civil works of this project (the double-tracked section was nearly as long as this project, and there was no delay in the construction schedule).

¹⁴ According to the project consultant, ad hoc trains were counted together with regular trains before the project, but at present only regular trains are counted. Currently, around 200 ad hoc trains run every year.

Table 1: Average Line Capacity and Number of Trains Operating on the Section under this Project

(Unit: trains/day)

	Baseline (1995)	Planned (2009 = three years after completion)	Actual (ratio against plan)	
			2008 = 1 year after completion	2010 = three years after completion
Kutoarjo – Yogyakarta				
Line capacity	59 73 (after improvement of signals)	N.A.	146	146
Number of trains operating				
• Passenger	57	76	106 (139%)	113 (149%)
- Regular service	46		80	88
- Additional service during <i>lebaran</i>	11		26	25
• Freight	16	29	N.A.	8

Sources: DGR; PT KAI.

Note: *Lebaran* is the holiday to celebrate the end of *ramadan* (fasting month) and the peak season for railway passenger transportation.

Figure 4 shows the railway transportation volume on the project section¹⁵. The passenger volume dropped in the early 2000s, sharply increased after that, and in 2010 reached 15.9 million, which is higher than the planned volume. The freight volume is still below the planned level, but in 2010 it reached 1.12 million tons, 85% of the plan.

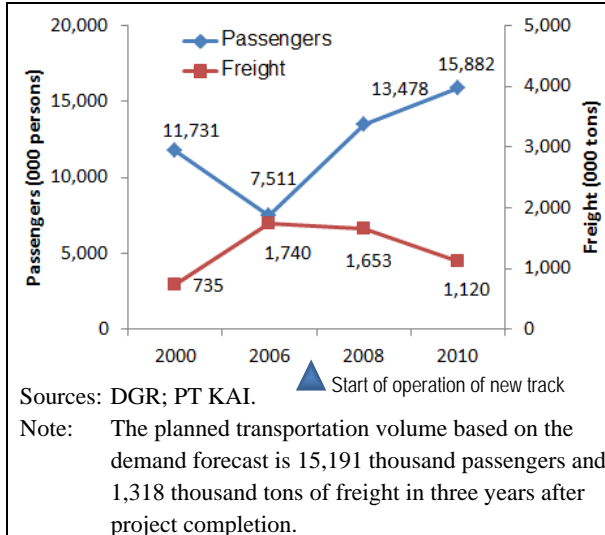


Figure 4: Railway Transportation Volume on the Section under this Project

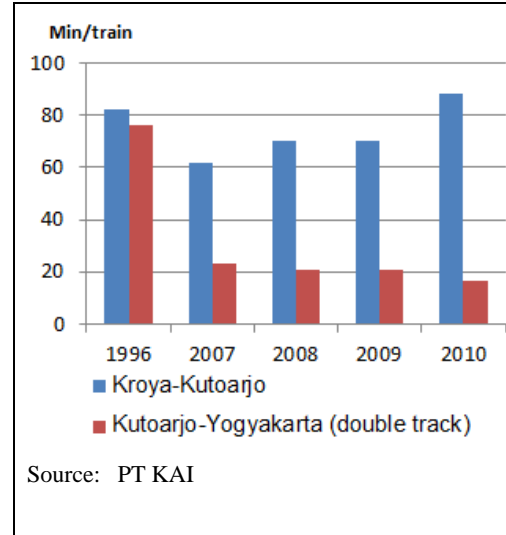


Figure 5: Waiting Time for Trains

¹⁵ As the transportation volume of the project section only is not counted, the count in the table followed the way used in the project appraisal: it added up the transportation volume of all trains that passed the project section. Although this way may generally over count the volume as it counts all passengers who travelled at least some section between Jakarta and Surabaya, including those did not pass the project section, this report used it to compare the current volume with the data at the appraisal.

(2) Punctuality

As shown in Figure 5, the waiting time to let other trains pass at stations was significantly shortened after the project on the Kutoarjo – Yogyakarta section that was double-tracked by the project. Considering the waiting time not being shortened on the Kroya – Kutoarjo section (to be double-tracked by the next project), this reduction of waiting time is considered as an effect of this project.

However, it is difficult to judge the project effects on reduction of delay time against the time table: the data collected from PT KAI on average delay time between Kutoarjo and Yogyakarta are 2-3 minutes on departure and 4-9 minutes on arrival, which had been very little even before the double tracking. On the other hand, the night executive class train from Yogyakarta to Jakarta that the evaluator rode for this ex-post evaluation was delayed by 15 minutes on departure and by 52 minutes on arrival, though there was no delay on the section under this project. The executing agency and PT KAI explained the situation that train schedule must be adjusted with single track sections, and thus double tracking on one segment of a line does not simply reduce delays on the whole line.

3.3.1.2 Results of Calculations of Internal Rates of Return (IRR)

(1) Financial Internal Rate of Return (FIRR)

At the time of the appraisal for the first loan agreement, the FIRR of this project was calculated at 2.1%, with the project life of 40 years and taking the project cost and operation and maintenance cost as the cost items and the passenger fee revenue as the benefit item.

In recalculating FIRR at the time of the ex-post evaluation substituting the actual figures of cost and benefit, the data on passenger revenues from the project section only were not available. Therefore, it was assumed that a half of the passengers who purchased tickets at stations within the project section would have travelled that section, and the recalculated FIRR turned out to be 4.2%¹⁶. The appraisal document explained the reason for the low FIRR that passengers of economy class, which was unprofitable due to low level of fares, accounted for 75% of total passengers. Following the policy to expand business class and executive class, this rate has been lowered to 58% by the time of the ex-post evaluation, and is considered as a factor for the increase of FIRR.

¹⁶ As mentioned in 3.5.4 *Current Status of Operation and Maintenance* below, the section under this project is operated by two branch units of PT KAI: the Operation Area V (DAOP V) (including Kutoarjo Station) and the Operation Area VI (DAOP VI) (including the other stations than Kutoarjo on the project section). The FIRR recalculation only used the revenue data from DAOP VI because data from DAOP V were not available. When including 100% of the passenger revenue to DAOP VI, FIRR was recalculated at 14.7%.

(2) Economic Internal Rate of Return (EIRR)

The planned EIRR value calculated at the appraisal for the first loan agreement was 15.1%. The project life was 40 years, and the cost items included the project cost and operation and maintenance cost. The benefit items included (i) time-saving benefits and (ii) cost-reduction benefits on freight transportation (compared to freight transportation by bus).

In recalculating EIRR at the time of the ex-post evaluation, only part of the item (i) above was included in the benefit due to constraints of the data collected. The time-saving benefit used in the recalculation is the one from Prambanan Express (PRAMEX), a commuter train around Yogyakarta that started operation after this project (also see 3.3.2 *Qualitative Effects*), as travel time difference between with- and without the project is quite clear on this train only. Even with such a limited inclusion of benefits compared to the appraisal, the recalculated value was relatively high at 12.5%¹⁷. This possibly shows the fact that travel time by PRAMEX, used by a total of 3 million people in 2010, is 45 minutes shorter than by bus.

3.3.2 Qualitative Effects

(1) Promotion of Shift from Road- to Railway Transportation

During the field study for the ex-post evaluation, the evaluator and the supporting team travelled from Yogyakarta to Kutoarjo in two groups, one by PRAMEX and the other by vehicle. The two groups departed Yogyakarta at the same time, and it took to PRAMEX 1 hour and to vehicle 1 hour and 45 minutes to arrive in Kutoarjo, thus saving 45 minutes by PRAMEX. This train started operation in 2007 using the double track sections Kutoarjo – Yogyakarta – Solo¹⁸. Before 2007 there had been no commuter trains in the area, and people had travelled between Kutoarjo and Yogyakarta by road. Therefore, PRAMEX, used by 3 million people every year, can be considered as an effect of the double tracking, and the above-mentioned time saving is obviously due to this project. Also, as shown in Table 2, the fare of PRAMEX is lower than the bus fare. As of April 2011, there is only economy class on PRAMEX, but operation of executive class is planned in May 2011.

¹⁷ Sufficient data were not available on transportation volume and operation cost of trains other than PRAMEX to estimate their relationship with the extent of travel time reduction. That is to say, this recalculation is not based on the same assumptions as the ones made at the appraisal, and thus cannot be simply compared to the planned value. Even so, the evaluator considers the recalculated value as “relatively high” for the following reasons: the EIRR calculated at the appraisal for the second loan agreement was 8.6% using the same cost and benefit items as those in the first appraisal, and the recalculated value this time is higher than that; in other international development finance institutions, there are many cases where projects with EIRR higher than 10-12% are evaluated as economically viable.

¹⁸ The double tracking on the 59km-long section between Yogyakarta and Solo was completed in 2007 with financial resources of the Indonesian government.

Table 2: Comparison of PRAMEX and Buses (Kutoarjo – Yogyakarta)

	PRAMEX	Buses
Travel time	1 hour	2 hours
Fare	Economy: 9,000 Rupiah (approx. 90 yen)	Economy: 10,000 Rupiah (approx. 100 yen) Executive: 40,000 Rupiah (approx. 400 yen)

Sources: DGR; hearing from PT KAI.

(2) Opinions of railway customers on punctuality and safety

In the beneficiary survey conducted at the ex-post evaluation¹⁹, most of the interviewed passengers of the South Line said that safety and punctuality of railway transportation had improved after the double tracking (Figure 6). A majority of the respondents agreed on the improved safety of railway transportation and the reduction of waiting time after this project, which is consistent with the tendency of the train operation data shown in 3.3.1 *Quantitative Effects*. There were no significant differences in responses of economy class passengers and executive/ business class passengers.

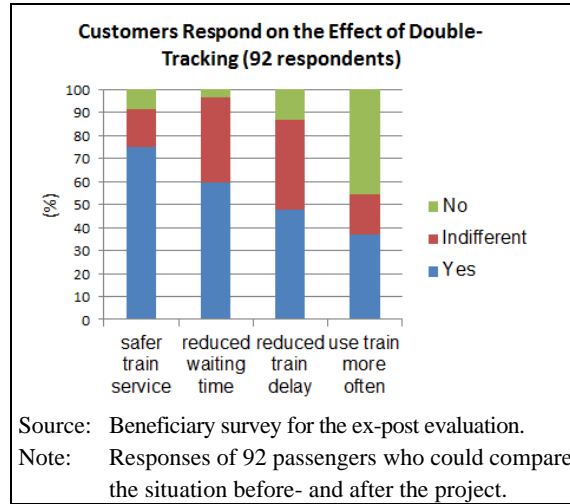


Figure 6: Opinions of Passengers on Changes Before and After the Project

This project has largely achieved its objective, therefore its effectiveness is high.



On PRAMEX (Women-only Car)



Kutoarjo Station renovated by this Project

¹⁹ The outline of the beneficiary survey conducted for the ex-post evaluation is as follows: location – waiting rooms of Kutoarjo Station and Yogyakarta Station and around these stations; respondents – total 175 persons (135 passengers, rail 4 freight forwarding companies, and 35 residents, shop owners or drivers along the project section); data collection method – questionnaire-based structured interview conducted by Indonesia consultants.

3.4 Impact

3.4.1 Intended Impacts²⁰

Economic activities in- and around the project site is centered in Yogyakarta Special Province (Region) with population of approx. 3.5 million. In 2008, a total of 5.27 million people used railways in the province. At the time of the ex-post evaluation, however, the evaluator did not find significant information on impacts of railway transportation to regional economy besides the railway operation indicators presented above. According to Yogyakarta province, the double tracking enabled PT KAI to provide better railway services to people in the province, but there are no cases to clearly show its contribution to economic revitalization yet. Meanwhile, the province is planning to open a new commuter train service on the section under this project²¹. PRAMEX, the existing commuter train that is already full, shows high demand for short-distance railway transportation centered in Yogyakarta. Therefore, the said new commuter plan might be an additional effect of this project once it is realized.

Impacts of freight transportation on economic development are expected in near future: there is an increase in transportation of cement from Karangtarun (Ciracap) Station near Kroya toward Solo and Surabaya; regular service to transport mineral water of one of the biggest manufacturers in Indonesia from Ceper Station (between Yogyakarta and Solo) is set to start in 2012.

3.4.2 Other Impacts

(1) Impacts on natural environment

By the nature of this project that was to construct a new track besides the existing one, additional environmental load is considered as small. During the project implementation, the consultant conducted and reported the environmental monitoring as planned, and no problem in environment is observed.

The CO₂ reduction effect of PRAMEX, operating as a result of the double tracking, is roughly estimated to be 1,205 tons in 2010 with the assumption that passengers who used to travel by bus shifted to railways²².

²⁰ The data presented in this section were taken from Statistics Indonesia (BPS) or PT KAI.

²¹ The Railway Law revised in 2007 gave a way for local governments and private sector to enter into railway operation. Accordingly, the Yogyakarta province plans to operate a commuter train service on the 91.5km length of Kutoarjo – Yogyakarta – Klaten sections, and conducts studies for it. When the evaluator visited the province for the ex-post evaluation, they were in a process of requesting DGR for the construction of ten stops (small stations) for the commuter train on the said sections.

²² For this trial calculation, it was assumed that a half of PRAMEX passengers used the section double-tracked by this project. Then, the reduction amount was calculated by multiplying the unit CO₂ reduction of 13g per person (the unit applied at the project appraisal, calculated by subtracting emission by train from emission by minibus) by a half of the 185,383,873 person-km.

(2) Land acquisition and resettlement

No particular problems are found. Although the land for the new track all belonged to PT KAI (State Railway Corporation (PERUMKA) at the time of the appraisal of this project), additional 600m length of land totalling 22,640 m² had to be acquired following the modification of the line shape of a curve. The actual area increased to 36,117 m² as a result of the detailed design, and the executing agency reports the acquisition was processed in accordance with laws and regulations.

As for resettlement, the original plan included the relocation of approx. 20 houses between Kutoarjo and Yogyakarta and approx. 20 houses near Yogyakarta Station. The actual number of houses relocated was 11, all of which were moved a little backward from the original location as enough land space was there. A total of 221 persons were affected by the acquisition and relocation, and the compensation and relocation cost paid to them based on the law amounted 7,400 million Rupiah and up to 1.1 million Rupiah per m², respectively²³. The appraisal for the second loan agreement in September 2003 confirmed the completion of the payment by that time. Neither the executing agency nor JICA reports any disputes related to the relocation and compensation.

(3) Unintended positive/negative impacts

Both positive and negative impacts of this project on road transportation are pointed out. On the positive side, the removal and improvement of some level crossings (by the construction of a road bridge over the railroad and underpasses with box culverts) brought smoother traffic.

On the negative side, PT KAI mentioned that waiting time at level crossings is longer than before due to the increase of trains, and that risks of accidents when passing the railroad are higher due to higher speed of trains²⁴, though quantitative evidence was not available. To respond to those issues, DGR constructed five more underpasses after the project, and PT KAI carries out socialization activities for people. Despite such measures, according to PT KAI, only 39 level crossings out of 149 remaining between Kutoarjo and Yogyakarta are attended by watchmen.

The beneficiary survey also got both positive and negative opinions of people: out of 34 valid responses of residents, shops or drivers nearby railway stations, 8 said they increased their income after the project, and 15 said decreased. However, this result is considered to be related to the PT KAI's operation policy (such as restriction of informal vendors'

²³ No information was found on the resettlement action plan. The project did not plan and implement such measures as development of resettlement sites and livelihood recovery programs.

²⁴ Due to no more need to stop trains to let other trains pass and the improvement of the track conditions.

entrance to Yogyakarta Station) rather than effects of the double tracking.

As seen above, the intended impacts are considered to have been brought though some objective data were not available. Also, both positive and negative effects of the project on road transportation were pointed out.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance (O&M) of all railway infrastructures including this project are carried out by PT KAI, a 100% state-owned enterprise. The ownership of railway infrastructures and facilities follows the two-tiered system: Article 13 of the 1992 Railway Law stipulates that tracks, bridges and signals are owned by the government and leased without charge to PERUMKA, the predecessor of PT KAI, while rolling stock, railcar shops and stations are owned by PERUMKA. PERUMKA, after established as a public corporation from the national railways in 1991, became a state-owned company with the new name PT KAI. The O&M of railway infrastructures and facilities is still based on the two-tiered system.

PT KAI maintained the PERUMKA's organizational structure for track maintenance: the section constructed by this project is under the responsibility of the Operation Area V (DAOP V; up to 5km east of Kutoarjo Station) and the Operation Area VI (DAOP VI; remaining 59km length of the section).

In this way, there is no drastic change in ownership, management and O&M system of railway infrastructures and facilities even after the O&M agency was converted to a state-owned company, and no serious problem is found.

3.5.2 Technical Aspects of Operation and Maintenance

Technical problems are not seen, either. Under each DAOP, Department of Track and Bridges and the Department of Signals and Communication operate and maintain the project facilities. The number of and the technical level of staff (59 persons at each DAOP) are reported to be sufficient. Every year, technical staff must receive 300-350 hours of training including on-the-job training and training at PT KAI training institutes, government training institutions or universities.

CTC system is operated by staff trained by this project. According to them, no trouble has occurred since the system was introduced.

3.5.3 Financial Aspects of Operation and Maintenance

O&M budget for railway infrastructures is provided as government subsidy to PT KAI, but that is offset by the rent for the infrastructures paid by PT KAI to the government. Therefore,

O&M cost for railways is substantially borne by PT KAI.

As for the section developed under this project, the cost for infrastructure maintenance under DAOP VI is covered by their sales (Table 3).

At the time of the project appraisal, PERUMKA had been continuously in a deficit since the time of the national railways. After becoming a state-owned enterprise, PT KAI turned a profit. In the fiscal year 2009, the current profit reached 200 billion Rupiah (equivalent to approx. 2 billion yen) and the net profit after tax 150 billion Rupiah. As shown in Table 4, they maintain good fiscal conditions. Further analyses are needed to rigorously identify factors for the PT KAI's improved management, but among the findings from this ex-post evaluation study, it is noteworthy that they have made efforts for earnings recovery through strengthening of business/executive class services and purchase of rolling stock to stimulate demand.

Table 3: Income Statement of DAOP VI

(Unit: million Rupiah)

	2008	2009	2010
Operating revenue	303,685	342,106	351,332
Operating expenses	237,311	251,941	285,213
of which infrastructure maintenance	22,100	28,320	26,928

Source: PT KAI.

Table 4: Financial Indicators of PT KAI

(Unit: million Rupiah and %)

	2008	2009	2010
Net profit	(82,633)	154,800	216,336
Return on asset	-1%	3%	4%
Current ratio	218%	246%	227%

Source: PT KAI.

3.5.4 Current Status of Operation and Maintenance

According to DGR, the infrastructures and facilities developed by this project are in good conditions. In particular, the new track has been ranked in the first place in Indonesia by Track Quality Indices (TQIs)²⁵ that PT KAI regularly measures. Also, the parallel existing track is ranked in the next highest place. It has only been a few years since the project completion, and the high values of TQIs might reflect the high quality of the construction works. In addition to them, however, TQIs are further improving on both existing and new tracks on the project section, which shows the appropriateness of the maintenance works. The good conditions of the infrastructures

²⁵ TQI is an indicator to show track conditions. PT KAI calculates TQI by combining the following four parameters: gauge (distance between rails), cross level (difference in height of rails), longitudinal level (evenness of the top of rails) and alignment (evenness of the side of rails). PT KAI defines the four categories (I to IV) of speed limits of trains on each segment of track depending on the value of TQI. The higher the level (i.e., the lower the value of TQI), the higher speed is allowed. For example, The TQIs of the project section based on the measurement in January 2011 were 17.4-19.6 on the new track and 20.1-22.8 on the existing track. Based on these values, the new track was categorized in Level I (TQI<20) in which the speed limits are 100-120km per hour, while the existing track was categorized in Level II (20<TQI<35) in which the speed limits are 80-100km per hour.

and facilities were also observed during the site visit for the ex-post evaluation.

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high. The improvement of the O&M agency's financial health following the transition from a public corporation to a state-owned enterprise is considered as an important enabling factor for the high sustainability.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The double tracking on the Kutoarjo – Yogyakarta section on Java South Line is relevant to both policy priority and railway transportation demand. Although efficiency of the project implementation was fair due to delays in tender, high effectiveness is shown in such evidence as the increased number of trains and transportation volume compared to those with single track as well as the shortening of waiting time. As a consequence, access to Yogyakarta was improved. The status of operation and maintenance of the facilities developed by the project is good, and thus sustainability is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Enhancement of the project effects through coordination with local governments

It was observed that after the project completion, DGR has coordinated with the provincial government of Yogyakarta in construction of underpasses (i.e., removal of level crossings), though there is an opinion among local people that the number of underpasses has not been enough yet. On the other hand, Yogyakarta province is pushing forward a plan to introduce a new commuter train service on the section double tracked by this project. In order to enhance the project effects to the area, it is recommended that DGR continue coordination with local governments to further promote the on-going initiatives, specifically including the elimination or improvement of level crossings as well as consideration of the new commuter train plan of Yogyakarta province.

(2) Enhancement of the project effects through completion of successive double tracking projects

In the evaluation of effectiveness of this project, it was found difficult to improve train punctuality by double tracking of one segment of a line. As of the time of the ex-post evaluation, projects are going on to double track the Kroya and Kutoarjo section and part of the Cirebon – Kroya section, both of which are quite congested. In order to ensure more punctuality, DGR is recommended to pursue steady implementation of those double

tracking projects.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

(1) Double tracking works combined with rehabilitation of existing track

As mentioned in the *Efficiency* section, this project completed the highly-complicated procedures of rehabilitating existing track and bridges and constructing new track and bridges without interference with train operations and within the schedule that was originally planned for construction of new track only. Since sections for which double tracking is planned in Indonesia will all require track rehabilitation, future double tracking projects will similarly include both new and existing track works. In order to implement those projects efficiently and bring effects as soon as possible, the schedule of this project especially the process of switching between the new track construction and the rehabilitation of the existing track, is a good reference.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs	(Plan as of the appraisal in November 1996)	
Double tracking	Kutoarjo - Yogyakarta	Section is same as planned
Track- Main Line	64km	Same as planned
- Siding	12km	26km
- Turnout	80 sets	95 sets
Bridges	79 steel bridges	10 steel bridges 9 concrete bridges 1 concrete road bridge 186 box culverts
Signalling	Centralized traffic control (CTC) Automatic block system Electric interlocking system for 10 stations 8 safety facilities for level crossings	Same as planned Same as planned For 8 stations 26 facilities
Consulting services		
International engineers	699 MM	856 MM
Local engineers	1,376 MM	2,990 MM
2.Project Period	October 1996 – September 2003 (84 months)	December 1996 – September 2007 (130months)
3.Project Cost		
Amount paid in Foreign currency	7,393 million yen	11,285 million yen
Amount paid in Local currency	8,595 million yen (186,848 million Rupiah)	5,132 million yen (442,105 million Rupiah)
Total	15,988 million yen	16,417 million yen
Japanese ODA loan portion	11,991 million yen	15,062 million yen
Exchange rate	1 Rupiah = 0.046 yen (As of April 1996)	1 Rupiah = 0.037 yen (Average between 1998 and 2009)