EX-POST EVALUATION 2010: PACKAGE II-2
(INDONESIA, KAZAKHSTAN, CHINA)

OCTOBER 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

SANSHU ENGINEERING CONSULTANT
INTERNATIONAL DEVELOPMENT ASSOCIATES, LTD.

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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2008, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2007. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

October 2011
Masato Watanabe
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

Minor amendments may be made when the contents of this volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

Contents

Indonesia

Ex-Post Evaluation of Japanese ODA Loan Project

Dumai Port Development Project (Phase II)

External Evaluator: Takako Haraguchi, International Development Associates

0. Summary

The expansion of cargo-handling facilities of Dumai Port is relevant to both policy priority and cargo demand including palm oil. Although efficiency of the project was fair due to delays in the project implementation, high effectiveness is shown in such evidence as the cargo throughput that largely exceeds the planned level as well as the shortening of the duration of vessel's stay. As a consequence, this project supported the high economic growth brought by palm oil production in Riau province. The status of the 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

Palm oil wharf newly constructed by the project

1.1 Background

Dumai Port, located in Dumai city, Riau province in the eastern central area of Sumatera Island and facing Straits of Malacca, is the second largest public seaport in the island after Belawan Port in Medan in the north. In response to the increasing cargo demand along with the rapid economic development of the province, Dumai Port Development Project Phase I (loan agreement signed in 1989) was implemented including the construction of a 400m-long multipurpose wharf and the procurement of cargo handling equipment. However, further expansion of the port became necessary as oil palmplantation expanded in the hinterland and thus the throughput of palm oil increased much faster than projected besides general cargo.

1.2 Project Outline

The objective of this project is to respond to increasing demand for cargo handling at Dumai Port located in Riau Province, Sumatera Island, by construction of palm oil wharf and extending the multipurpose cargo wharf, thereby contributing to the promotion of commodity distribution and the economic development of the region.

Loan Approved Amount/ Disbursed Amount	3,819 million yen / 2,895 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	January 1998 / January 1998
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
Borrower / Executing Agency(ies)	Republic of Indonesia / Directorate General of Sea Transportation (DGST), Ministry of Transport
Final Disbursement Date	November 2008
Main Contractor (Over 1 billion yen)	PT. Adhi Karya (Indonesia) – Marubeni Corporation (Japan) – Rinkai Construction (Japan) (JV)
Main Consultant (Over 100 million yen)	PT. Diagram Triprosri (Indonesia) - PT. Indulexco (Indonesia) – Pacific Consultants International (Japan) (JV)
Feasibility Studies, etc.	"The Study on the Development Project of Dumai Port in the Republic of Indonesia", JICA, 1983. (F/S)
Related Projects (if any)	"Dumai Port Development Project E/S" (L/A signed in 1983) "Dumai Port Development Project" (L/A signed in 1989) (hereafter "the Phase I project"

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)

None.

3. Results of the Evaluation (Overall Rating: A[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance with the Development Plan of Indonesia

The Sixth Five Year Development Plan (1994-1998) at the time of the appraisal of this project held several development objectives in the sea transport sector including (i) port development as a center of economic activities, (ii) development of international hub ports functioning as cargo collection bases, (iii) development of non-commercial ports in remote areas, and (iv) development of local container and distribution bases. They are consistent with the direction of this project to develop a local hub port.

At the time of the ex-post evaluation, the Medium-term National Development Plan (2010-2014), the current national development plan, holds sea transport objectives such as (i) safety and security that meet international shipping standards, (ii) increase of market share of national shipping fleet, (iii) strengthening of international competitiveness and national logistic distribution by enhanced quality and quantity of services, (iv) more accessibility of sea transportation services in border regions, (v) establishment of the national port master plan, and (vi) promotion of entry of local governments, state-owned enterprises, private sectors and communities into sea transport services based on the new Maritime Law of 2008. The significance of this project is seen particularly in the light of the objectives (iii) and (vi) above. In relation to the objective (vi), options of sea transport development are more various than before, and the status and priority of the Dumai Port development do not seem fully consistent in several policies[3]. Nevertheless, such difference is not too big to nullify the significance of this project.

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

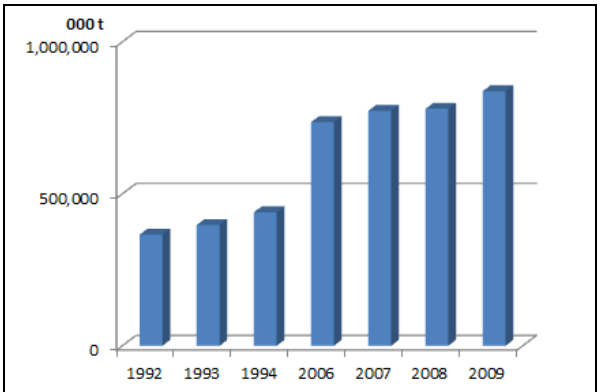
2 ③: High, ② Fair, ① Low

3 First, the National Long-term Development Plan (2005-2025) positions seaports in Sumatera island in the following way: Batam Port located in a free trade zone in Riau Islands province as the hub port; Belawan Port as the international port for liquid and dry bulk cargo; and others as feeder ports for Batam Port. Second, the Medium-term Strategy of Ministry of Transport (2010-2014), aiming to selectively develop strategically-valuable ports, gives high priority to Belawan Port among ports in Sumatera. Third, in Riau province, development of Tanjung Buton Port in the capital Pekanbaru city is underway with participation of the Directorate General of Sea Transportation (DGST). Forth, the national port master plan was still being prepared when the evaluator visited Indonesia for the ex-post evaluation, but according to the Directorate of Ports and Dredging of DGST, the directorate in charge of the master plan, construction of a new public port in Dumai was being considered.

3.1.2 Relevance with the Development Needs of Indonesia

There was a very high demand for cargo, especially palm oil both before and after the project. At the time of the appraisal, the annual average growth rate of cargo throughput of Dumai Port in the past 10 years exceeded 20% (compared to 4-6% in the whole country). In particular, palm oil throughput grew at 30% every year during 1991-1996. At that time, the congestion was increasing at Dumai Port, which only had the old cargo wharf and the 400m-long multipurpose wharf with pipelines to ship palm oil. The total cargo throughput, 2,320 thousand tons in 1996, exceeded the port capacity of 2,100 thousand tons.

As for the situation up to the time of the ex-post evaluation, the total throughput of Dumai Port grew at the annual average rate of 11% (or 5% on palm oil only) between 1994 and 2009, while in the whole country the rate was 4% in 1994-2006. The production of palm oil in Riau province increased at 16% every year in 1994-2009, which shows the continuing need for shipping facilities.



Sources: JICA appraisal documents; Ministry of Transport.

Figure 1: Demand for Maritime Cargo in Indonesia

The cargo handled at Dumai Port mainly consists of liquid bulk (palm oil) and dry bulk, and containers are not handled at the times of both the appraisal and the ex-post evaluation.

Demand for passenger transportation was growing fast at the time of the appraisal, and the throughput of Dumai Port was 450 thousand persons in 1996 compared to the capacity of 330 thousand persons. The demand then grew at annual average of 2% in 1996-2009. However, according to the Dumai branch of Indonesia Port Corporation I (PT Pelabuhan Indonesia I: PELINDO I), the operation and maintenance agency of the port, factors such as the emergence of low-cost air carriers[4] make the future prospect on passenger demand unclear.

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.

[4] For example, several carriers have regular flights between Jakarta, Pekanbaru and Riau Archipelago (including Batam and Bintang Islands that are free trade zones) and between Pekanbaru, Malacca and Kuala Lumpur (Malaysia).

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 originally-planned outputs of this project consisted of the expansion of port facilities (extension of the multipurpose cargo wharf, construction of a palm oil wharf, revetment and reclamation, construction of container yard, etc.) and the consulting services. The comparison of the planned and actual outputs is shown in the table at the end of this report. In summary, the items related to the multipurpose wharf were reduced from the plan mainly due to a rise in steel price, while those related to palm oil shipping were increased[5]. Also, the construction of container yard was judged as too early, and thus only revetment and reclamation were carried out[6]. Besides the original plan, the project produced some additional outputs such as the construction of an inter-island wharf, rehabilitation of the existing multipurpose wharf (replacement of fenders that were developed in the Phase I project), and construction of drainage lines to prevent flooding.

These works are components of the phased construction plan based on the Dumai Port development master plan, and the mentioned changes of the outputs are either partial acceleration or postponement of the master plan. In the light of the development needs over Dumai Port as mentioned in *3.1 Relevance*, it is considered appropriate that the project allocated more resources to palm oil facilities that are highly needed. Figure 2 shows the master plan and the status of its implementation, and Figure 3 shows the layout of the port including the outputs of this project. Also see Table 1 for the overview of major wharfs.

As a result of the site visit, the completion of the outputs was well confirmed.

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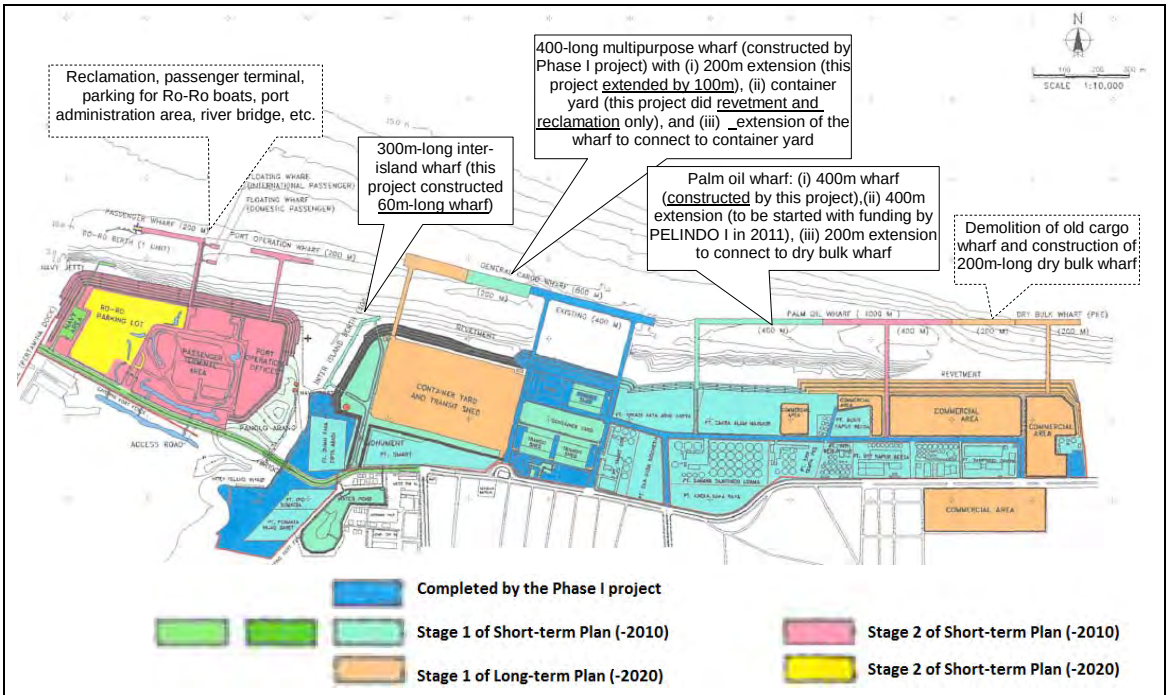
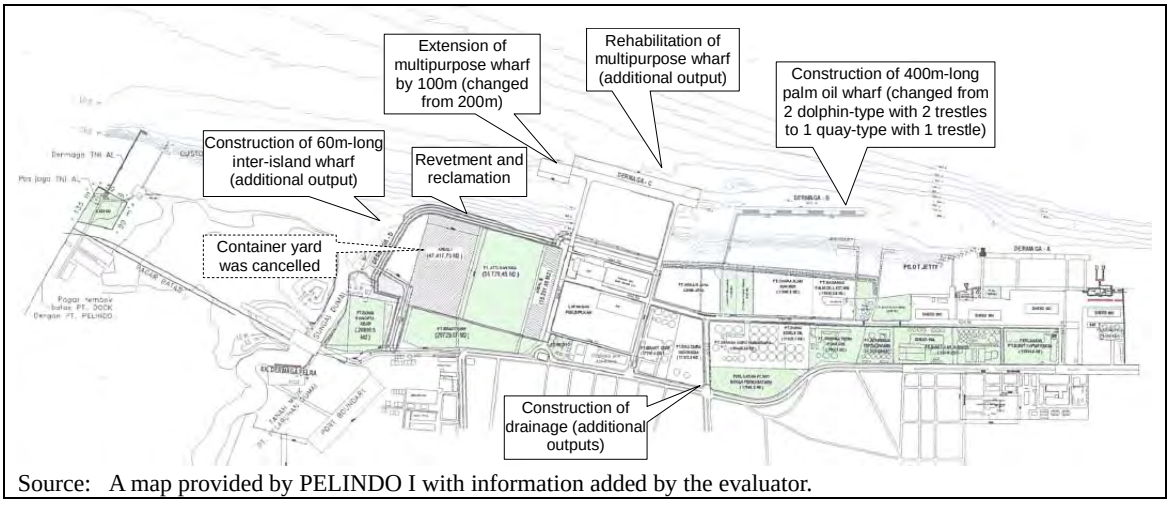
[5] The original plan designed two 200m-long dolphin-type berths. However, the project changed the design to one 400m-long quay-type wharf, which allows more flexible berth layout (i.e., it can provide two or three berths depending on the size of vessels).

[6] Meanwhile, the project widened the extended part of the multipurpose wharf from planned 25m to actual 40m to accommodate cranes to handle containers.



Source: A map provided by PELINDO I with information added by the evaluator.
Note: Text boxes in solid line have information on the works carried out by this project.

Figure 2: Dumai Port Development Master Plan (revised in 2009) and the Project Outputs



Source: A map provided by PELINDO I with information added by the evaluator.

Figure 3: Layout of Current Facilities of Dumai Port including the Outputs of this Project

Figure 1: Overview of Major Wharfs of Dumai Port (Underlined: outputs of this project)

Name of wharf	Length(m)	Width(m)	Depth(m)	Use
Old cargo wharf	348	16	-7	General, palm oil
Multipurpose wharf	400＋100	25, 40	-11	Dry bulk, palm oil
Palm oil wharf	400	18	-11	Palm oil
Inter-island wharf	60	10	-3	Small and medium size interisland ship

Source: PELINDO I

View of the palm oil wharf and pipe rack from the end of the trestle

Extended part of the multipurpose wharf after unloading of palm kernel shell (livestock feed). The Phase I project output is in back.

The consulting services including detailed design, tender assistance and environmental impact assessment (EIA) for future construction of the passenger terminal were provided as planned. In addition, a study on the common pipeline system for more efficient cargo handling and port management was conducted, and the port management information system was developed. The work volume of the consultants increased due to the additional services and the extended implementation period (see *3.2.2.1 Project Period*).

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned total project cost estimated at the appraisal was 5,092 million yen, and the actual cost was 3,281 million yen, which was lower than planned with the cancellation of some outputs[7]. Likewise, the approved amount of the Japanese ODA loan was 3,819 million yen, and the disbursed amount, 2,895 million yen, was lower than planned.

3.2.2.2 Project Period

In the appraisal, the project period was planned to be 76 months from November 1997 (signing on the loan agreement) to February 2004[8]. The actual project duration, 133 months from January 1998 to January 2009, was significantly longer than planned. The delays are notable in the stages of selection of consultants (26 month longer than planned) and tender (21 month longer than planned), where it took long time to consider the method of consultant selection and conditions of procurement and to carry forward the procedures[9] under the

[7] Out of the planned project cost as of the appraisal, approx. 1,350 million yen had been estimated for the outputs that were cancelled later. Therefore, taking the additional outputs into consideration together, the actual project cost is still lower than planned even after subtracting the cost that would have been spent for the cancelled outputs.

[8] In this project, the project completion date was defined as the end date of the maintenance period (one year after the completion of construction).

[9] Due to the delays, the loan agreement period was extended, and the end date of the period was

unstable political and economic conditions.

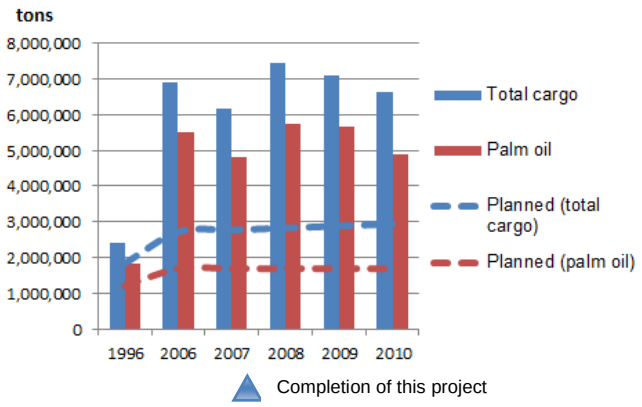
Although the project cost was within the plan, the project period exceeded, therefore efficiency of the project is fair.

3.3 Effectiveness (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

Figure 4 shows the cargo throughput of Dumai Port. It had already exceeded the demand forecast[10] at the project appraisal in 1996, and continued to increase to a level far beyond the handling capacity before the project completion. In 2010, total cargo throughput was approx. 6,630 thousand tons, of which palm oil, the main cargo, was approx. 4,890 thousand tons. The volume of cargo other than palm oil (such as fertilizer and forest products) has remained almost the same level over time. The number of palm oil companies operating at Dumai Port increased from 5 (with the total palm oil tank capacity of 160 thousand tons) to 13 (380 thousand tons) before and after the project.



Sources: Made based on data from JICA appraisal documents and PELINDO I.
Note: The planned values are based on the demand forecast made by the Phase I project in 1993. The values of 2006 show the levels set as the handling capacity.

Figure 4: Trend of Cargo Throughput at Dumai Port

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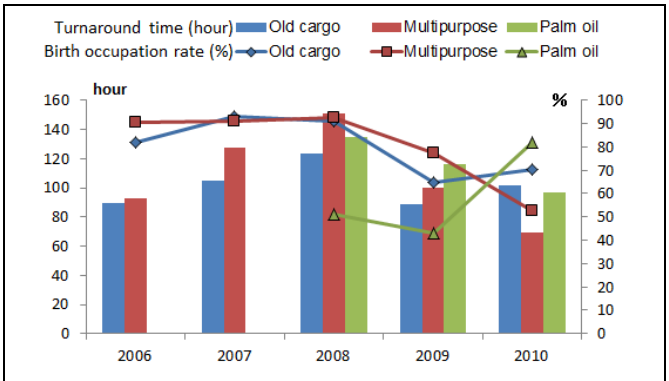
changed from February 2006 to November 2008. According to the record of the Indonesian government and Japan International Cooperation Agency (JICA), the situation was as follows: in the original plan, project consultant was to be selected by direct appointment of the consultant that provided services in the Phase I project. However, under the unstable political and economic conditions due to the currency crisis and political power shift, the executing agency proposed to select consultant by short list. It took a long time for JICA to review the proposal for appropriateness and for the executing agency to prepare the short list. As for the mode of procurement, the executing agency proposed to ease the pre-qualification criteria to promote price competition under the said political and economic conditions. JICA insisted on adherence to the standard and appropriate criteria, and it took time for both sides to reach a consensus.

[10] The appraisal of this project used the demand forecast made in 1993 by the Phase I project.

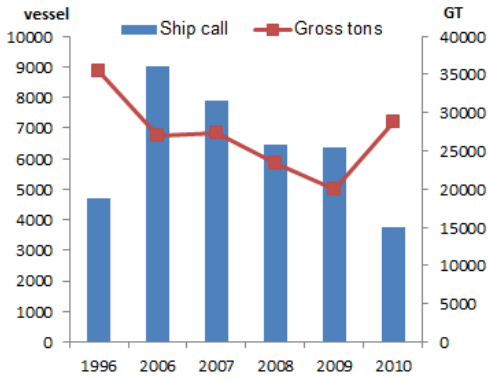
The project decreased, though not to the ideal level, the congestion of the port[11]. As shown in Figure 5, the length of stay of vessels in terms of turnaround time was shortened after the project to average 85 hours, while the ideal time is considered to be around 48 hours[12]. Berth occupation rates were very high at around 90% before the project, and they generally decreased as this project increased the number of berths from 7 to 11 (Table 2). However, the rate on the palm oil wharf increased again to more than 80% in 2010.

Ship calls also increased rapidly from the level at the appraisal. However, the gross tonnage is decreasing except the year 2010 (Figure 6), and trends of increasing in size of vessels are not seen unlike many other seaports.



Source: Made from data provided by PELINDO I.
Note: See Table 2 for appropriate level of berth occupation rates.

Figure 5: Turnaround Time per Vessel at Dumai Port



Source: Made from data provided by PELINDO I.

Figure 6: Number of Ship Calls to Dumai Port

Table 2: Number of Berths of Dumai Port

	Before this project	After this project (planned value)	After this project (Actual)	Appropriate level of berth occupation rate
Old cargo wharf	3 berths	3 berths	3 berths	59%
Multipurpose wharf	4 berths	6 berths	5 berths	70%
Palm oil wharf	None	2 berths	3 berths	59%

Sources: JICA appraisal documents; PELINDO I.
Note: Appropriate level of berth occupation rates depends on the number of berths. The figures of the appropriate level presented in this table were taken from JICA.

[11] See also *3.3.2 Qualitative Effects.*

[12] Turnaround time is defined as the time between a vessel's arrival at- and departure from the pilot station (water area where a pilot meets the vessel), including waiting time at the pilot station, navigation time to- and within the port, loading/unloading and related activities. The plan at the project appraisal was to reduce waiting time from 2.08 days to 0.04-0.01 days. However, as Dumai Port defines and records time spent by vessels in a different way from the one as of the appraisal, data comparable to the planned values were not collected.

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

(1) Financial Internal Rate of Return (FIRR)

FIRR was not calculated in the project appraisal, but the financial analysis made by the consultant of the Phase I project computed a negative FIRR. At the time of the ex-post evaluation, a trial re-calculation was made by substituting the actual figures of cost (project cost, operation and maintenance cost, and interest payment for this project) and benefit (port revenue) as much as possible[13], and the value turned out to be 4.9%. A possible factor for the higher FIRR than the calculation by the Phase I project consultant is the great decrease in the project cost compared to the estimated amount. Although the higher cargo throughput than estimated is also considered to have affected the value, verification was not possible due to the limitation of available data.

(2) Economic Internal Rate of Return (EIRR)

The planned EIRR value calculated at the appraisal was 13.1% taking the project cost and operation and maintenance cost as the cost items and reduction of waiting time as the benefit item. At the time of the ex-post evaluation, EIRR was roughly recalculated at 22.2% but to the extent possible with the available data[14]. Like FIRR, the increase in the recalculated value might be due to the significant decrease in the project cost. Further analysis is not possible, however, because before- and after comparison of data is difficult.

3.3.2 Qualitative Effects

(1) Opinions of palm oil companies

On the site visit for the ex-post evaluation, the evaluator conducted interviews with two palm oil production and export companies (one of them is the biggest in the industry) and one shipping company that handles palm oil. All of the three respondents expressed a common opinion that the congestion of the port was eased since this project developed facilities specialized for palm oil tankers. All three companies have expanded their palm oil business at Dumai Port (e.g., concentration of palm oil from plants in other areas of Indonesia to Dumai Port and increase of frequency of visits to Dumai Port). They also said

[13] The project life was set at 30 years in the same way as the calculation in the calculation by the Phase I project consultant. In estimating the extent of contribution of this project to the total revenue, data were not available on the proportion of revenue from each wharf, and thus the proportion of the number of berths at each wharf was alternatively used.

[14] As data on waiting time with the same definition as that of the appraisal were not available, the turnaround time before the project completion (2007) was assumed as the length of stay that a vessel must have spent without this project. Then, time saving was calculated as the differences between the said turnaround time and the turnaround time after 2008. Data on current ship operation cost were not available, either. Therefore, the evaluator used the amount that was used at the appraisal after converting to the price of the base year. The project life was set at 30 years.

that waiting time was shortened from 6-7 days before the project to 2-3 days after the project. Although the figures are on a different level, the trend is consistent with the one described in *3.3.1 Quantitative Effects*.

(2) Improved efficiency of cargo handling

According to PELINDO I, the productivity of the loading/unloading at Dumai Port was improved due to the development of facilities specialized for palm oil by this project as well as to some other factors such as the enhancement of cargo handling equipment (PELINDO I's financing) and the enhancement of performance of palm oil pumps[15] (financing by palm oil companies).

On the other hand, some point out that the productivity is not maximized yet. For example, the project consultant recommended the streamlining of palm oil handling by introducing a common pipe system. However, there is a study by another expert that palm oil companies prefer using their own pipes rather than the common pipe, inside which they consider residuals of other companies' products might remain. In addition, one pointed out that palm oil tankers are allowed to berth at other wharfs than the palm oil wharf, and the mixing of tankers and other cargo ship especially at the multipurpose wharf may hinder efficient berth management. PELINDO I commented on the former issue that the common pipe has been installed as planned, but the evaluator could not check details of its utilization. As for the latter issue, the evaluator could not reach a firm conclusion given an opposite opinion from the above-mentioned shipping company that it is favourable for them that they have more choices of wharfs to berth tankers.

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

3.4 Impact

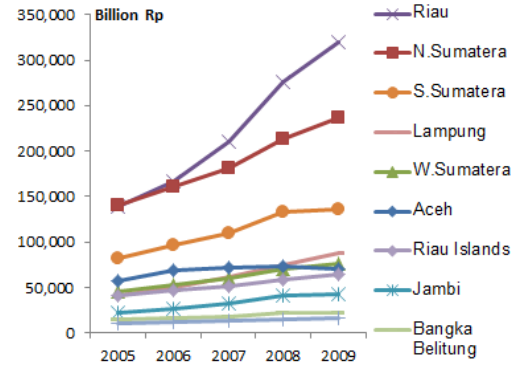
3.4.1 Intended Impacts

Figure 7 shows the gross regional domestic products (GRDP) of provinces in Sumatera Island. GRDP of Riau province shows the fastest growth in the island, being 319 trillion Rupiah in 2009. This GRDP consists mostly of production of plantation crops such as palm, and the cropped area is likewise increasing steadily (approx. 1,910 thousand hectares in 2009). GRDP per capita in Riau province in 2009 was approx. 60 million Rupiah (approx. 600 thousand yen), which was far beyond the national average of 24 million Rupiah. As foreign export accounts for around 80% of the palm oil throughput at Dumai Port (shown in *3.3 Effectiveness*), the port is

[15] According to PELINDO I, the productivity was improved from 150 tons per hour to 300 tons per hour.

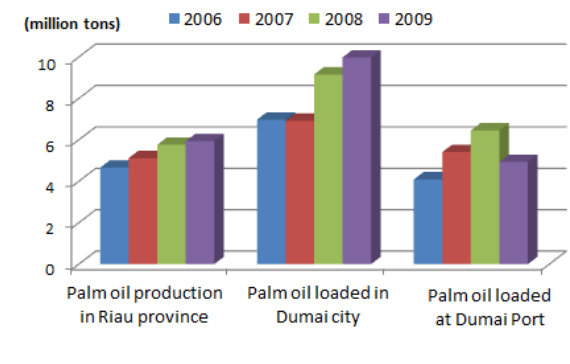
considered to have contributed to economic growth through exports of palm oil, a principal product of the area.

At the same time, the data collected for the ex-post evaluation also show large contribution of other ports in Dumai, not only Dumai Port: while palm oil production in Riau province was 5,940 thousand tons, loading at Dumai Port was 4,930 thousand tons[16]. In Dumai city, there are five to six ports or similar facilities where big private palm oil companies ship their products. If including the volume of palm oil loaded at those facilities, the total loading in Dumai City amounted to approx. 7,950 tons, which shows palm oil is collected and loaded from outside Riau province (Figure 8) [17].



Source: Statistics Indonesia (BPS).

Figure 7: GRDP in Sumatera Island



Sources: BPS; DGST; PELINDO I.

Figure 8: Palm Oil Production in Riau Province and Loading in Dumai

The maximum positive impacts of this project might be hampered by the poor condition of access roads. Palm oil produced in Riau province is all transported by tank trucks. However, the two-lane national highway is heavily damaged. On the way to the port during the field study, the evaluator often observed large trucks that were stuck in potholes and causing traffic jams. The condition of roads in Dumai City is also poor, and some point out dusts (see the next section). Such situations might negatively affect container transportation that may be started in future[18].

[16] Palm oil production in Riau province is equivalent to around 30% of the production in Indonesia. At Belawan Port, the largest seaport in Sumatera Island, 300-400 tons of palm oil is loaded every year. According to PELINDO I, palm oil shipped from Belawan Port is collected mainly from Aceh province and the northern part of Riau province.

[17] In 2009, the loading at Dumai Port decreased while the loading at other ports/shipping facilities in Dumai increased. This is understandable if considering the fact that Dumai Port only cannot absorb the demand and the on-going transition of organizational structure of port management that have been dominated by PELINDO so far (see *3.5 Sustainability*), and thus would not lessen effectiveness of Dumai Port, which has handled palm oil beyond its capacity.

[18] The evaluator visited Belawan Port during the field study for the ex-post evaluation. Belawan Port is around 10km away from Medan, the capital of North Sumatera province, and the road conditions looked good with a well-maintained motorway connecting the port and the city center.

Currently, a north-south highway in Sumatera is being planned as part of the Indonesia Economic Development Corridors[19]. The highway route from Pekanbaru, the capital city of Riau province, to Dumai is being discussed. Once this plan is realized, access to Dumai Port will remarkably improve.

Palm Oil Company Area
in the Port Premises

Berth Allocation Meeting with Shipping Companies Organized by PELINDO I Dumai Branch Every Day

3.4.2 Other Impacts

(1) Impacts on natural environment

According to the EIA approved in 1997, this project was not likely to cause serious environmental problems because large-scale dredging was not planned and general environmental measures including disposal of effluent water and control of turbidity[20] were considered. Actually, no particular problems were reported during the project implementation.

After the project completion, the Dumai branch of PELINDO I, the operation and maintenance agency of this project, commissions environmental monitoring to an outside laboratory twice a year. The monitoring results and measures taken by PELINDO I are as follows:

Air: there is a high level of dust inside and outside the port due to bulk cargo and trucks. The other parameters are within the standard. In response, PELINDO I has repaired the

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When the evaluator visited Dumai Port, it took more than five hours to drive the 150km-long route from the provincial capital Pekanbaru to the port.

[19] Indonesia Economic Development Corridors is a plan of the Indonesia government to build economic clusters and business centers in all major islands in Indonesia to support local economies.

[20] The passenger terminal construction plan in the Dumai Port development master plan required a separate EIA as the project site was in the habitat of mangroves, and the EIA was included in the consulting services of this project. However, the passenger terminal plan was later excluded from the master plan due to low profitability and a passenger terminal that a local government constructed near Dumai Port.

port roads and surrounding roads little by little, though that seemed not enough yet. There seems no such measure as water sprinkling.

Water: although water is polluted to some extent by palm oil facilities, passengers and nearby residents, the measured parameters are all within the standard. No information was available on countermeasures by PELINDO I.

Flora and fauna: mangroves have decreased due to car exhaust and construction works, but there are no quantitative indicators to support it. PELINDO I has planted mangrove trees within the port after the project.

Living conditions of people: according a survey to people, a half of the respondents agreed on positive changes such as “more convenience” and “more employment”, both due to the expansion of the port, and the rest half said “no change”.

(2) Land acquisition and resettlement

This project did not involve land acquisition and resettlement.

(3) Unintended positive/negative impacts

No other impacts than already mentioned were not observed.

From the above, the intended impacts are considered to have been brought. When estimating the number of beneficiaries of this project, population of Riau province (approx. 5,540,000 according to the census in 2010) would give an indication of the size of the beneficiaries including indirect ones.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

As planned in the appraisal, the operation and maintenance (O&M) agency of this project is the Dumai branch of PELINDO I, a 100% state-owned enterprise. As one of the four PELINDO in the country, PELINDO I is in charge of 12 ports located in three provinces in the north and central Sumatera, including Dumai Port and Belawan Port.

On the government side, DGST has Port Administration Office (ADPEL) at each port. ADPEL, headed by Harbourmaster, has been in charge of port security.

PELINDO had exclusively undertaken management (excluding security), operation and maintenance of public ports, until the new Maritime Law in 2008 clearly separated responsibilities of port administrators and port operators, and provided that the government select port operators through competitive bidding among state-owned enterprises, local governments and private companies that are registered as port entities.

The separation of port administrator and port operator is to be gradually carried out from

large ports[21]. It had not taken place on Dumai Port as of the time of the field study for the ex-post evaluation, though there was a plan to set up the Port Authority to undertake port administration[22]. As for operation of existing ports, Article 344 of the new Maritime Law stipulates that the current operators keep operating them. PELINDO I is already entitled as a port entity, and has received business permit from Ministry of Transport under the new system. Therefore, it is likely that PELINDO I will continue operation of Dumai Port without new bidding.

The ownership of facilities of Dumai Port will be continuously on PELINDO I based on Article 345 of the Law and the notice dated May 2011 from Ministry of Transport to PELINDO I.

As shown above, it is likely that the ownership and operator of Dumai Port will not change even with the transition of the port management structure, thus being no serious problem on operation and maintenance of this project.

3.5.2 Technical Aspects of Operation and Maintenance

Technical problems are not seen, either. Although the technical staff (12 persons) in charge of maintenance of Dumai Port was reported as insufficient in both quantitative and qualitative terms at the time of the project completion, the number was increased to 16 persons after the project, and PELINDO I says they are sufficient in both number and capabilities. The number of port operation staff is 82 including pilots and tag boat operators.

PELINDO I provides periodic training to the staff at its head office in such subjects as maintenance of the electric system and civil engineering facilities as well as operation of equipment.

3.5.3 Financial Aspects of Operation and Maintenance

The O&M cost for the facilities developed by this project is all borne by PELINDO I without government subsidies. PELINDO I is in a good financial condition, and receives “AA” (the highest rating) every year from Ministry of State-owned Enterprises.

There is a system of cross-subsidizing branches (ports) under PELINDO I, but Dumai Port turns a profit every year given the increase in cargo throughput. The O&M expenses are thus fully covered by the revenue.

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[21] Currently, public ports in Indonesia are classified in Special Port (4 ports including Belawan Port) and Class I to Class V ports. Dumai Port is one of the 11 Class I ports.

[22] Port Authority is to be set up under DGST. At ADPEL in Dumai there was an explanation that ADPEL, which is also under DGST, would undertake a role of Port Authority. However, official information was not available on details of the administrative structure after the transition.

Table 3: Income Statement of Dumai Port

(Unit: million Rupiah)

	2008	2009	2010
Operating revenue	123,959	164,226	137,713
Operating expenses	92,659	83,637	92,320
of which O&M	64,374	50,746	55,126

Source: PELINDO I.

Table 4: Financial Indicators of PELINDO I

(Unit: million Rupiah and %)

	2008	2009	2010
Net profit	180,366	174,725	164,824
Return on asset	12%	11%	8%
Current ratio	70%	81%	60%

Source: PELINDO I.

3.5.4 Current Status of Operation and Maintenance

According to PELINDO I, the facilities developed by this project are maintained in accordance with the port maintenance guidelines. The good conditions of the 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.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The expansion of cargo-handling facilities of Dumai Port is relevant to both policy priority and cargo demand including palm oil. Although efficiency of the project was fair due to delays in the project implementation, high effectiveness is shown in such evidence as the cargo throughput that largely exceeds the planned level as well as the shortening of the duration of vessel's stay. As a consequence, this project supported the high economic growth brought by palm oil production in Riau province. The status of the 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

The division of responsibility between port administrators and port operators is under way based on the new Maritime Law. It is expected that Dumai Port will soon have Port Authority to which the responsibilities such as management of vessels and navigation that PELINDO I currently undertakes will be transferred. When that occurs, DGST is recommended to share information with ADPEL and PELINDO I in order to avoid any negative effects on port operation and maintenance.

In addition, it is recommended that DGST ensure full coordination among future development of Dumai Port and other port development initiatives taken by local governments and the private sector, new entities to port operation.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

As mentioned in the *Impact* section, the conditions of access roads to Dumai Port are bad, and that might affect the further achievement of the impact-level objectives of this project. The scope of this project did not include road development components, while there are cases of in other countries where port development projects incorporated such components that would closely associated with project effects and consequently brought an improvement of the total logistic distribution in the area. Although many countries have separate administrative bodies for port development and road development, respectively, future port development projects should consider a possibility of maximizing the impacts by totally developing ports and access roads.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs Extension of multipurpose wharf	Length: 200m, Width: 25m, Depth: -10m	Length: 100m, Width: 40m, Depth: -10m
Construction of palm oil wharf	2 dorphin-type Length: 200m, Depth: -10m Length: 200m, Depth: -12m	1 quay-type Length: 400m, Depth: -12m
Construction of trestles	1 for multipurpose wharf, 2 for palm oil wharf	For multipurpose wharf: cancelled, For palm oil wharf: same as planned
Construction of container yard	3ha	Cancelled
Revetment and reclamation	Revetment: 1,000m Reclamation: 260,000m^2	Same as planned
Other construction works	Soil improvement, utilities	Soil improvement: mostly as planned Water supply: cancelled <u>Additional outputs:</u> Inter-island whafr (length: 60m) Drainage, Mooring dolphins, Rehabilitation of existing facilities
Consulting services International engineers Local engineers	 132 MM 219 MM	 176.5 MM 267.3 MM
2.Project Period	November 1997 – February 2004 (76 months)	January 1998 – January 2009 (133 months)
3.Project Cost		
Amount paid in Foreign currency	2,650 million yen	742 million yen
Amount paid in Local currency	2,442 million yen (186,848 million Rupiah)	2,539 million yen (317,375 million Rupiah)
Total	5,092 million yen	3,281 million yen
Japanese ODA loan portion	3,819 million yen	2,895 million yen
Exchange rate	1 Rupiah = 0.052 yen (As of April 1997)	1 Rupiah = 0.008 yen (Average between 2001 and 2008)

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.

Map provided by the project consultant

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)	"Java North Line Bridge Rehabilitation Project (1)(2)" (L/A signedin1992 and 1995) "Construction of Railway Double Tracking of Cikampek – Cirebon (1)(2)" (L/A signed in 1994 and 1998) "Railway Double Tracking on Java South Line (3) (E/S)" (L/A signed in 2007) "Railway Double Tracking on Java South Line (3)" (L/A signed in 2008)

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: A[1])

3.1 Relevance (Rating: ③[2])

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.

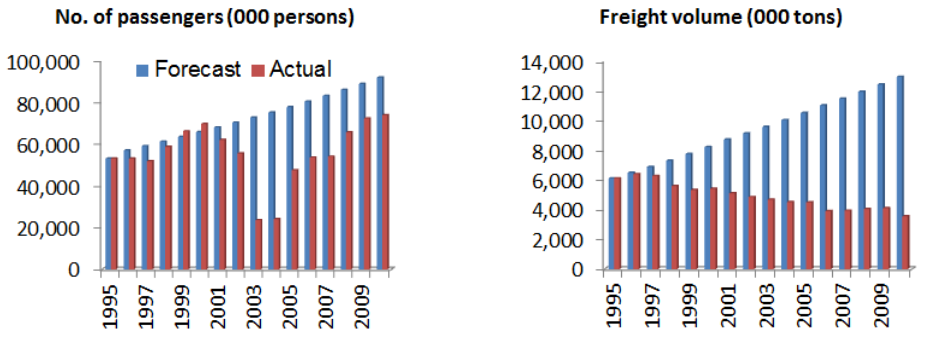
However, the actual railway demand in Java up to the time of the ex-post evaluation is below the above-mentioned projection, and freight demand is even decreasing. The passenger volume sharply dropped in the early 2000s in response to the economic situation, and then increased significantly, which made 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 carriers[3]. 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 2011[5]. 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.



Sources: JICA appraisal documents; project consultant; PT KAI.
Note: Passenger volume does not include those of JABOTABEK Line, the commuter train network for Jakarta metropolitan area and surroundings.

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).

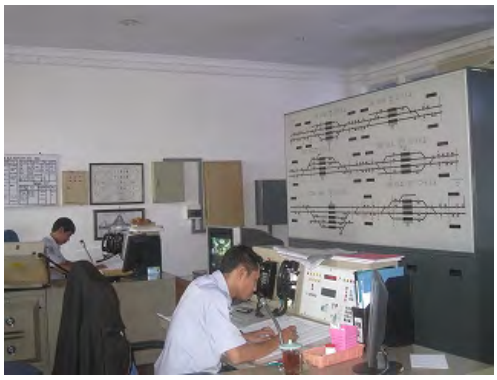
(i) The original plan of construction works consisted of the double tracking of the 64km length of section between Kutoarjo and Yogyakarta and development of the signalling system. As a result of design review, the amount was increased for embankment, excavation, siding track and turnouts, and the design 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 system[6] 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 stations[7], 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 appropriate[8].

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 Yogyakarta[9] 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*).

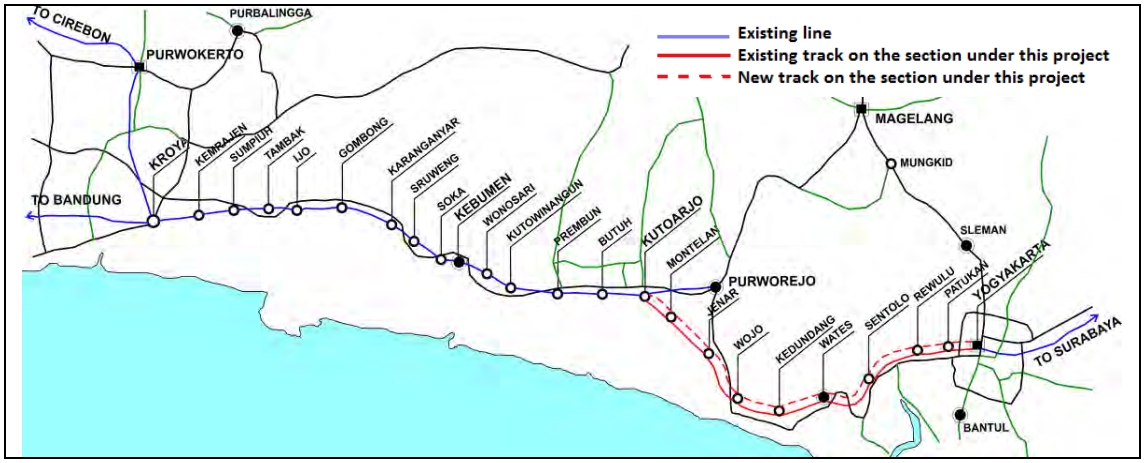


Figure 3: Map of the Section under the Project

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 plan[10].

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 2003[11]. 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 contract[12].

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[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 works[13] 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 project[14], besides the above-mentioned decrease in freight transportation demand and aging of wagons.

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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

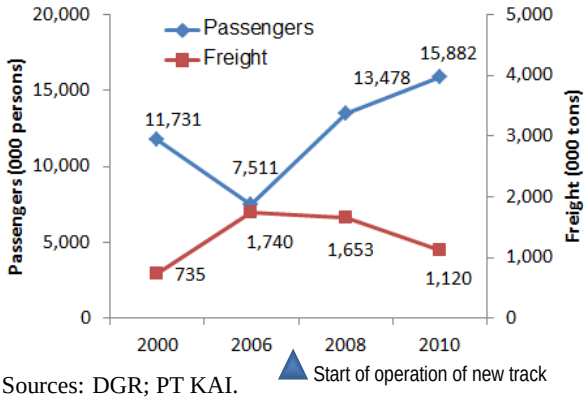
(Unit: trains/day)

Kutoarjo – Yogyakarta	Baseline (1995)	Planned (2009 = three years after completion)	Actual (ratio against plan)	
			2008 = 1 year after completion)	2010 = three years after completion
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 *lebaran*	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.

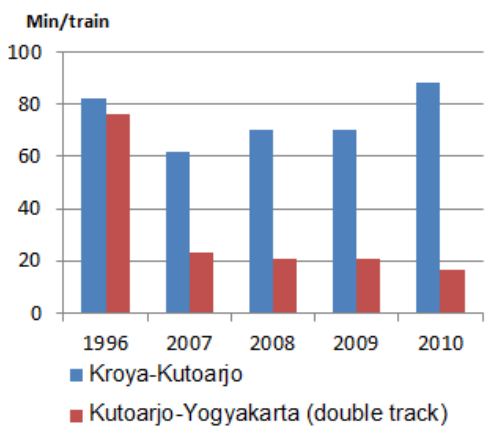
Figure 4 shows the railway transportation volume on the project section[15]. The passenger volume dropped in the early 2000s, sharply increased after that, and in 2010 reached 15.9 million, which is higher than the planned volume. The freight volume is still below the planned level, but in 2010 it reached 1.12 million tons, 85% of the plan.



Sources: DGR; PT KAI.

Note: The planned transportation volume based on the demand forecast is 15,191 thousand passengers and 1,318 thousand tons of freight in three years after project completion.

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



Source: PT KAI

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 – Solo[18]. 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.

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[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.

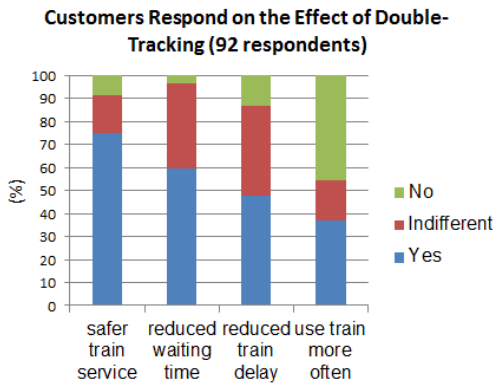
Table 2: Comparison of PRAMEX and Buses (Kutoarjo – Yogyakarta)

	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 evaluation [19], 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.



Source: Beneficiary survey for the ex-post evaluation.
Note: Responses of 92 passengers who could compare the situation before- and after the project.

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 Impacts[20]

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 project[21]. 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 CO_2 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 railways[22].

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[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 CO_2 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 m^2 had to be acquired following the modification of the line shape of a curve. The actual area increased to 36,117 m^2 as a result of the detailed design, and the executing agency reports the acquisition was processed in accordance with lows 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 m^2, respectively[23]. 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 trains[24], 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 venders'

[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)

Kazakhstan

Ex-Post Evaluation of Japanese ODA Loan Project
Western Kazakhstan Road Network Rehabilitation Project

External Evaluator: Masami Tomita, International Development Associates Ltd.

0. Summary

This project aimed at improving transport efficiency and safety in Western Kazakhstan by rehabilitating road sections severely deteriorated, thereby contributing to regional development.

Relevance of this project is high, as the project is consistent with priority areas of Kazakhstan's development plans and Japan's ODA policy, and moreover development needs for the project are high. Efficiency of the project is fair, as the actual project cost exceeded the plan while actual project period was reasonable taking into account the large increase of outputs. Effectiveness of the project is high, as the project more or less achieved targets in major operation and effect indicators, and the overall goal of the project, which is to contribute to regional development, has also been mostly achieved. Sustainability of the project is fair, as some problems have been observed in terms of financial status of the operation and maintenance (O&M) agency and insufficient number of maintenance equipments, while no major problems have been observed in the O&M system and technical capacity.

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

1. Project Description

Project Locations

Aktyubinsk- Khromtau Section

1.1 Background

The transportation sector has an important role in Kazakhstan which is approximately seven times the size of Japan and where population, industries and natural resources are scattered around in its vast territory. Historically rail transport used to have the largest share in terms of freight transport in land transportation. However, after the collapse of the Soviet Union, there

have been efforts to change specialized industrial structures centred around Moscow, and demands for short-to-medium-distance transportation networks (road networks) have been increasing as a result of development of service industries in Kazakhstan which need to respond promptly and flexibly to customer needs. Road transport has always had the largest share in terms of passenger transport in land transportation.

The main road in Western Kazakhstan is the Western Kazakhstan Road which connects Astana, Aktyubinsk, Uralsk, and Atyrau and crosses the country from east to west. The road is mainly used for transportation by trucks to carry natural resources, grains, oil products, and goods and materials necessary for infrastructure construction, and it has a role as an international corridor which supports commodity distribution to neighbouring countries including Russia, as well as contributing to smooth distribution of goods within the vast country. However, the road surface was severely deteriorated due to improper construction in the first place and many overloading trucks, which hindered smooth travelling and transport efficiency. Particularly some sections in Kostanai and Aktyubinsk oblasts were extremely deteriorated and impassable, and urgent rehabilitation was required because of the strategic importance of the road.

1.2 Project Outline

The objective of this project is to improve transport efficiency and safety in Western Kazakhstan by rehabilitating road sections severely deteriorated and providing trainings on operation and maintenance, thereby contributing to regional development. Figure 1 shows the location of the project.

Source: Edited based on Ezilon.com (http://www.ezilon.com/maps/asia/kazakhstan-road-maps.html)

Figure 1: Project Site[1]

Loan Approved Amount/ Disbursed Amount	16,539million yen / 16,415million yen
Exchange of Notes Date/ Loan Agreement Signing Date	April, 2000 / December, 2000
Terms and Conditions	Interest Rate:2.2% Repayment Period:30 years (Grace Period: 10 years) General Untied (Consulting Service: Interest Rate: 0.75%, Repayment Period: 40 years (Grace Period: 10 years), Bilateral Tied)
Borrower / Executing Agency	The Government of the Republic of Kazakhstan/ Ministry of Transport and Communications
Final Disbursement Date	April, 2008
Main Contractor (Over 1 billion yen)	Alsim Alarko (Turkey) / Transstroy (Russia) (JV), Todini Costruzioni Generali S.P.A (Italy)

[1] While Special Assistance for Project Formation (SAPROF) covered the Uralsk-Aktyubinsk section and the Karabutak-Kyzylorda section, both sections were scoped out based on reasons that economic impact (EIRR) of the former section was low as the road was relatively in a good condition, and that the priority of the latter section was not high among the whole road network considering the limited amount of project budget. While there was a concern that scoping out the latter section might have a negative impact on future traffic volume in adjacent sections and hence on economic impact of the project as a whole, the latter section is under rehabilitation by the Kazakhstan Government and expected to be completed by the end of 2011.

Main Consultant (Over 100 million yen)	Nippon Koei (Japan) / Padeco (Japan) / Consult Co. Ltd (Kazakhstan) / Kazdoproject (Kazakhstan) (JV)
Feasibility Studies, etc.	・ The Study on Development of Road Network in Western Kazakhstan in the Republic of Kazakhstan (JICA, Yachiyo Engineering, Pacific Consultants International: February, 1997) ・ Special Assistance for Project Formation (SAPROF) (JICA: September 1999)
Related Projects	None

2. Outline of the Evaluation Study

2.1 External Evaluator

Masami Tomita, International Development Associates Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: October, 2010 – October, 2011

Duration of the Field Study: March 7, 2011 – March 19, 2011, May 15, 2011 – May 21, 2011

2.3 Constraints during the Evaluation Study

None

3. Results of the Evaluation (Overall Rating: B[2])

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan of Kazakhstan

"Kazakhstan-2030 (Prosperity, Security and Ever Growing Welfare of All the Kazakhstanis)" (October, 1997) emphasized a provision of transport infrastructure and in particular an increase of transportation capacity of major highways. Moreover, "Governmental Road Industry Development Program of the Republic of Kazakhstan for 2001-2005" aimed at construction and rehabilitation of 16,133 km in total of both domestic and international highways and improving 70% of entire domestic and international highways within the country during the plan period, among which the road sections covered by the project were specified as one of the top priority sections.

At the time of ex-post evaluation, while an improvement of 70% of entire domestic and international highways targeted in the above plan was not fulfilled (53% was improved) due to increased rehabilitation cost and budget constraints, the importance of international highways has increased and both "Road Sector Development Programme, Republic of Kazakhstan 2006-2012 years" and "Transport Sector Development Strategy 2006-2015" specify the

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[3] ③High, ②Fair, ①Low

Shymkent – Kyzylorda – Aktyubinsk – Uralsk – Samara section that includes the road sections covered by the project as one of the priority sections for rehabilitation.

Therefore, Kazakhstan's development plans emphasize construction and rehabilitation of major highways including the road sections covered by the project both at the time of appraisal and ex-post evaluation.

3.1.2 Relevance with the Development Needs of Kazakhstan

After the collapse of the Soviet Union, demands for provision of short-to-medium-distance transportation networks (road networks) have increased and consequently road transport's share has been increasing in terms of both freight and passenger transportation in Kazakhstan since the timing of project appraisal to the present. Tables below show the volume of freight and passenger transport by major modes of transportation in Kazakhstan. The percentage of freight transport by roads has increased from 11% in 1998 (before the project) to 20% in 2009, and the percentage of passenger transport by roads has increased from 60% in 1998 (before the project) to 85% in 2009.

Table 1: Volume of Freight Transport by Major Modes of Transport in Kazakhstan

(Unit: billion ton-km)

	1998	2007	2008	2009
Total	146	351	370	336
Rail	103	201	215	195
Pipeline	27	88	90	74
Road	**16**	**62**	**64**	**66**
Inland Water	0	0	0	1
Air	0	0	1	0

Source: 1998: appraisal document, other: Preliminary Data 2009 (National Statistical Agency)

Table 2: Volume of Passenger Transport by Major Modes of Transport in Kazakhstan

(Unit: million people-km)

	1998	2007	2008	2009
Total	33,906	124,367	127,455	130,466
Rail	10,669	14,587	14,719	14,520
Road	**20,317**	**103,879**	**106,878**	**110,278**
Urban Transport (trolleybus etc)	818	443	362	353
Inland Water	2	1	1	2
Air	2,100	5,457	5,495	5,313

Source: 1998: appraisal document, other: Preliminary Data 2009 (National Statistical Agency)

Atyrau has one of the largest refineries in Kazakhstan and it was expected that traffic volume from Atyrau to Uralsk would largely increase due to a large-scale construction and shipment of oil products as development of pipelines proceeds. On the other hand, this section of road runs parallel to the Ural River and snowmelt water used to cause a flood in the area in every spring,

and consequently part of the road was covered with water, which made the section impassable, and the surface and subgrade of many parts of the road were severely deteriorated, which urgently required rehabilitation of the road and improvement of drainage.

Moreover, the Kostanai – Aktyubinsk section was also severely deteriorated, as construction and maintenance of roads that run from east to west in Kazakhstan were inadequate during the Soviet era, and in particular, the section around Kostanai was almost impassable. However, it became important to improve road transportation networks connecting Astana with Western Kazakhstan since the capital of the country was moved from Almaty to Astana in 1997.

Western Kazakhstan is endowed with rich natural resources and development of these resources is expected to continue, which makes the road sections covered by the project that have a role as an international corridor strategically important for regional development, and development needs for the project are still high.

3.1.3 Relevance with Japan's ODA Policy

In Japan's Official Development Assistance Annual Report 1999, provision of support for development of human resources that contributes to democratization and market-oriented economic reform and financial cooperation for provision of economic infrastructures were emphasized as a priority area for assisting central Asia and Caucasus regions. Moreover, JICA's Policy for Overseas Economic Cooperation Operations emphasized provision of support for rehabilitation of deteriorated economic and social infrastructures as a priority area for assisting the region.

This project has been highly relevant with Kazakhstan's development plans, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Table 3 shows outputs of the project (planned and actual).

Table 3: Project Outputs (Planned/Actual)

Section	Planned	Actual
Atyrau – Uralsk	・ Length: 492km ・ Rehabilitated Length: 252km ・ Pavement: Asphalt ・ Reconstruction of Bridge: 6 ・ Repair of Bridge: 14 ・ Concrete Pipe Culvert: 1,715m ・ Concrete Box Culvert: 86m ・ Bus Shelter:28	・ Same as left ・ 488km ・ Same as left ・ As planned ・ As planned ・ 1,528m ・ 100m ・ 47
Kostanai border - Aktyubinsk	・ Length: 462km ・ Rehabilitated Length: 326.5km ・ Pavement: Asphalt ・ Reconstruction of Bridge: 4 ・ Repair of Bridge: 17 ・ Concrete Pipe Culvert: 2,360m ・ Concrete Box Culvert: 30m	・ Same as left ・ 444km ・ Same as left ・ 6 ・ 15 ・ 3,040m ・ 40m
Consulting Service	1. Detailed Design, Preparation of Bidding Documents 2. Evaluation of Bidding 3. Assistance for Contract Agreement 4. Construction Management 5. Documentation 6. Assistance for Environmental Monitoring 7. Training for O&M 1-6: Foreign: 225M/M, Local: 693M/M 7: Foreign: 56M/M, Local: 44M/M	Same as left 1-6: Foreign: 169M/M, Local:1,653M/M 7: Foreign: 56M/M, Local: 56M/M

Source: PCR / answer to questionnaire

Outputs of the project largely increased shown as above. Major reasons for the increase are as follows;

1) Rehabilitated Length: at the time of appraisal, it was agreed to rehabilitate the sections that had substantial needs for urgent rehabilitation, which were 326.5km (70.7%) of the Kostanai border – Aktyubinsk section (462km) and 252km (51.2%) of the Atyrau – Uralsk section (492km). However, at the timing of bidding agreement the Government of Kazakhstan requested to include the whole sections that were beyond the original scope into the project scope, which was approved based on the condition that the Government of Kazakhstan finance the increased project cost. However, the actual bid price turned out to be higher than the project budget estimated in bidding agreement, and consequently the Government of Kazakhstan requested to reduce the specification for rehabilitation of the 20km from Aktyubinsk in the Kostanai border – Aktyubinsk section and scope out of 18km around Kostanai, which was approved based on the condition that the Government of Kazakhstan rehabilitate the latter section (18km) separately by its own budget. The latter section has already been

rehabilitated by the Government.

2) Types of Rehabilitation: Four types of rehabilitation were planned at the time of appraisal; Type I: Overlay, Type II: Pavement Replacement, Type III: Reconstruction, and Type IV: Reconstruction with Raised Embankment. However, deterioration of roads turned out to be severer than expected at the timing of detailed design, and thus only Types III and IV were applied to almost all sections except for 20km from Aktyubinsk.
3) The Number of Bus Shelters: It was increased according to requests from local residents.
4) Length of Culverts in the Kostanai border – Aktyubinsk section: It was extended as there was an extensive flooding around the Aike Lake.
5) Consulting Service: M/M in total was increased due to a large increase of outputs, and the allocation of M/M among foreign and local consultants was changed in order to complete required works within a limited budget.

Uralsk – Chapaev Section

Bus Shelter

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned project cost at the time of appraisal was 22,052 million yen (foreign currency: 10,155 million yen, local currency: 11,897 million yen), of which Japan's ODA loan portion was 16,539 million yen. On the other hand, the actual project cost was 49,864 million yen (breakdown of foreign and local currency is unknown as the executing agency did not provide the figure), of which Japan's ODA loan portion was 16,415 million yen, and it was significantly higher than planned. However, the large increase of outputs needs to be taken into account in evaluating efficiency of the project. The Project Memorandum (P/M) was signed in November 2004 by JICA, the Ministry of Finance and the Ministry of Transport and Communications of Kazakhstan, which states the project output, cost and period after the amendment. According to the P/M, the planned project cost in total after the amendment was 37,921 million yen (of which

Japan's ODA loan portion was 16,539 million yen), and the actual project cost was 131% against the amended plan. The reasons for the increase of the cost are; 1) price escalation of construction materials and equipments and 2) unplanned project cost was required since radiation contamination was found in the embankment of the entrance to the Khromtau City in December 2003, which required special investigation and treatment.

3.2.2.2 Project Period

The planned project period at the time of appraisal was 56 months in total from December 2000 to July 2005 (the completion of the project was defined as the completion of civil works.[4]). On the other hand, the actual project period was 61 months in total from December 2000 to December 2005, and it was slightly longer than planned. However, the large increase of outputs needs to be taken into account as done for project cost. According to the P/M, the completion of civil works after the amendment was planned as February 2006, and the actual project period was 97% against the amended plan.

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

3.3 Effectiveness[5] (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

(1) Annual Average Daily Traffic

Tables below show the estimated and actual volume of annual average daily traffic of the road sections coved by the project. When comparing the estimated and actual traffic volume five years after the completion of the project, the actual traffic volume in total exceeds the estimated volume. Traffic volume of the Atyrau – Inder section is particularly large, and according to people involved in the project, this is because there has been a large scale construction related to development of pipelines in Atyrau and transportation of construction materials from a quarry in Inder to the construction site in Atyrau has been increasing. On the other hand, the actual traffic volume of the Inder – Chapaev section is below the estimated volume, and this seems to be due to the fact that population of the area has been historically small compared with that of other sections and traffic volume was overestimated at the time of appraisal, according to the executing agency.

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[4] The completion of the project was defined as the completion of civil works in the P/M signed in November 2004. The completion of the defect liability period was December 2006 and consulting services were completed in March 2007.

[5] The rating of the project's effectiveness takes into account the evaluation of the project's impact.

Table 4: Estimated Annual Average Daily Traffic

(Unit: vehicles/day)

Section		1998 (Baseline) (Before Project)	2005 (Project Completion)	2010 (5 years after Completion)
1	Aktyubinsk-Khromtau (89km)	1,480	921	1,120
2	Khromtau-Karabutak (124km)	236	1,020	1,241
3	Karabutak-Komsomolskoye (87km)	66	532	647
4	Komsomolskoye-Oblast Border (162km)	67	422	513
5	Atyrau-Mahambet (67km)	1,435	1,740	2,158
6	Mahambet-Zelenoye (53km)	N/A	771	953
7	Zelenoye-Kalmyokovo (100km)	N/A	718	885
8	Kalmyokovo-Chapaev (149km)	585	923	1,138
9	Chapaev-Uralsk (123km)	866	1,061	1,305
Total		N/A	8,108	9,960

Source: 1998: appraisal document, other: SAPROF Table 2.5.5 / Research on Internal Rate of Return and Operation and Effect Indicators in the Western Kazakhstan Road Network Rehabilitation Project (Padeco, 2000)

Note: Estimated values of section 1-4 in 2005 and 2010 were recalculated based on a condition that the Karabutak – Kyzylorda section was not rehabilitated. This section is currently under rehabilitation by the Kazakhstan Government and not completed yet, so the recalculated figures above are used in this evaluation.

Table 5: Actual Annual Average Daily Traffic

(Unit: vehicles/day)

Section		2006 (1 year after Completion)	2009 (4 years after Completion)	2010 (5 years after Completion)
1	Aktyubinsk-Khromtau (89km)	2,036	2,059	2,034
2	Khromtau-Karabutak (124km)	967	997	1,004
3	Karabutak-Komsomolskoye (87km)	727	758	667
4	Komsomolskoye-Oblast Border (162km)	412	776	684
5	Atyrau-Mahambet (67km)	3,233	3,507	3,304
6	Mahambet-Inder(122km)	2,825	3,749	3,238
7	Inder-Chapaev(180km)	332	380	467
8	Chapaev-Uralsk (123km)	812	1,108	1,027
Total		11,344	13,334	12,425

Source: answer to questionnaire

Note: Section 6 and 7 are different from sections on Table4, because in practice road management is conducted for the Mahambet – Inder section and the Inder – Chapaev section according to the oblast boundary, and traffic volume is also counted and recorded for each section above.

(2) International Roughness Index[6]

At the time of appraisal it was targeted at achieving IRI 3.0 in all sections covered by the project, however, IRI is not used for O&M of roads in Western Kazakhstan. An original method in Kazakhstan to measure roughness of road surface is used only in Aktyubinsk oblast (the result was 45% of sections covered by the project was very good, 32% was good, 23% was satisfactory and 0% was unsatisfactory on average in 2010), and this type

[6] International Roughness Index: an index proposed by the World Bank to evaluate roughness of road surface. (for reference) Under 4: Good, 4-7: Fair, 7-9: Poor, Over 9: Very Poor

of measurement is not conducted in West Kazakhstan oblast or Atyrau oblast due to the lack of necessary equipments (only visual checks are conducted).

(3) Travelling Time

The table below shows the actual time required to run the road sections covered by the project before and after the project implementation. Travelling time after the project has largely been reduced as road surface was severely deteriorated before the project. However, below are approximate figures as rigorous time measurement has never been conducted by the O&M agency.

Table 6: Changes in Travelling Time

(Unit: hour)

Section		1999 (Before Project)	2006 (After Project)
1	Aktyubinsk-Khromtau (89km)	2.0	0.8~1.0
2	Khromtau-Karabutak (124km)	4.0	1.1~1.4
3	Karabutak-Komsomolskoye (87km)	3.0	0.8~1.0
4	Komsomolskoye-Oblast Border (162km)	4.0	1.5~1.8
5	Atyrau-Mahambet (67km)	2.0	0.6~0.7
6	Mahambet-Inder (122km)	4.0	1.1~1.4
7	Inder-Chapaev (180km)	6.0	1.6~2.0
8	Chapaev-Uralsk (123km)	2.0	1.2~1.4

Source: answer to questionnaire

(4) Average Velocity

Average velocity of the road sections covered by the project was approximately 30-45km/hour before the project, and it has largely been increased after the project. Rigorous measurement has never been conducted by the O&M agency like travelling time, and neither the executing agency nor the O&M agency possessed data on average velocity after the project. According to the executing agency, the maximum permissible speed is 90km/hour for trucks and 110km/hour for other vehicles and average velocity after the project would not be largely different from the maximum permissible speeds as many vehicles travel these sections with excessive speeds. The ex-post evaluation team travelled by a four-wheel-drive car about 20km of the Aktyubinsk – Khromtau section, the whole Atyrau – Mahambet section (67km), and the whole Chapaev – Uralsk section (123km) during the field survey, and average velocity was approximately 100-110 km/hour in all sections.

(5) The Number of Traffic Accidents

Figures below show the number of traffic accidents occurred before and after the project implementation. The number of traffic accidents has increased in many sections after the

project. The larger the traffic volume is, the more the number of accidents is. According to the executing agency, the main reason for the increase of traffic accidents is because average velocity has increased due to improvement of road surface after the project implementation (particularly due to speeding and drunk driving).

(Unit: case, persons)

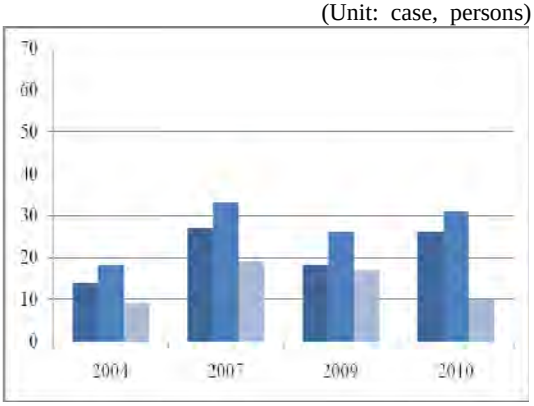


Figure 2: Aktyubinsk- Karabutak

(Unit: case, persons)

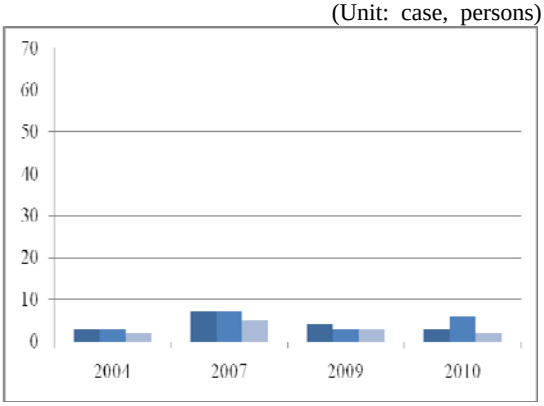


Figure 3: Karabutak-Kostanai Border

(Unit: case, persons)

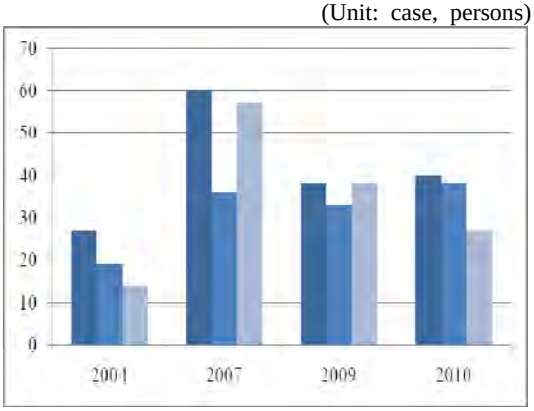
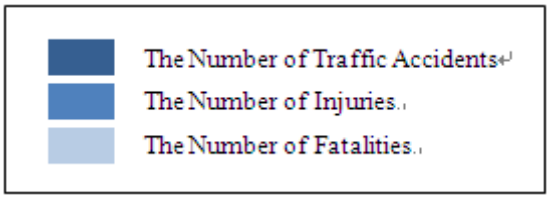


Figure 4: Atyrau- Uralsk



Source (all): answer to questionnaire
Note: The project was completed in 2005.

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

(1) Financial Internal Rate of Return (FIRR)

FIRR was not calculated in appraisal documents, as tolls are not collected in Kazakhstan.

(2) Economic Internal Rate of Return (EIRR)

EIRR was to be calculated based on benefits derived from savings in Vehicle Operating Cost (VOC) materialized by the project (savings of VOC are to be calculated by deducting VOC after the project from VOC before the project, according to IRI of each section of road). However, EIRR cannot be calculated as IRI is not used for O&M of roads in Western Kazakhstan and necessary data for the calculation could not be collected.

3.3.2 Qualitative Effects

(1) Benefits to Companies and Residents along the Western Kazakhstan Road

According to the executing agency, transportation costs were reduced due to improvements of road surface after the project implementation, which made travelling between cities such as Atyrau, Uralsk and Aktyubinsk convenient, and it further contributed to the growth of small and medium-sized businesses and improvement of life for local citizens.

(2) Capacity Building of O&M Staff (Effects of O&M Training)

Consulting services for strengthening O&M capabilities were provided in this project from January 2002 to July 2003, and O&M manuals and trainings on O&M contract management, road surface survey methods, O&M methods, and procurement and management of O&M equipments etc (period: approximately three weeks, the number of trainees: approximately 40) were provided. Those who attended the training programs told that the trainings were very useful for learning new O&M techniques, which suggests the trainings contributed to improvement of capabilities of staff to some extent. On the other hand, the fact that the necessity for preventive maintenance is not recognized yet, that the period of training was only three weeks and that the number of trainees was only 40 suggests that the scale of the training was not large enough to achieve strengthening the capabilities of staff involved in the project.

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

3.4 Impact

3.4.1 Intended Impacts

(1) Regional Development

The table below shows Gross Regional Domestic Product (GRDP) of Western Kazakhstan before and after the project. GRDP of the region has largely increased after the project implementation. The increase of GRDP in Atyrau oblast is particularly large, and this seems to be due to the increased revenue from oil related industries (including development of pipelines). As explained above, there has been a large scale construction related to development of pipelines in Atyrau and transportation of construction materials from a quarry in Inder to the construction site in Atyrau has been increasing, which suggests that the project has contributed to the large increase of GRDP in the region.

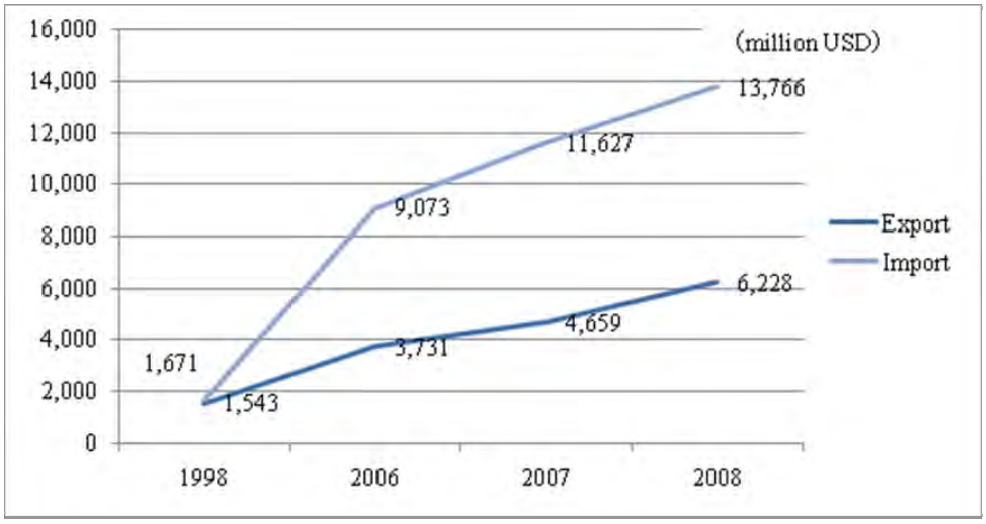
Table 7: Gross Regional Domestic Product

Oblast	GRDP (billion KZT)				Growth Rate 1997-2008(%)
	1997	2006	2007	2008	
Kazakhstan (GDP)	985.5	10,213.7	12,849.8	16,053.0	16.0
Western Kazakhstan	194.6	2,717.5	3,287.3	4,592.3	22.6
Aktyubinsk	48.5	517.0	679.0	871.5	17.0
West Kazakhstan	34.0	512.3	617.7	826.5	23.3
Atyrau	69.4	1,094.2	1,234.0	1,798.5	24.9
Mangistau	42.7	594.0	756.6	1,095.8	24.7

Source: 1997: SAPROF Table 2.3.4, other: National Accounts of the Republic of Kazakhstan 2004-2008 (National Statistical Agency)

(2) Trade Volume with Neighbouring Country (Russia)

The volume of trade with Russia has increased after the project implementation. It is difficult to indicate to what extent the project has contributed to the volume increase, as data on the trade volume with neighbouring countries through the road sections covered by the project was not obtained. However, some sections covered by the project consist part of the corridor connected to Samara in Russia and a large portion of traffic on the road is transportation by trucks (approximately 50% of traffic on the project road is transportation by trucks, according to the executing agency), which suggests that the project has contributed to some extent to the increase of the trade volume.



Source: 1998: SAPROF Table2.3.6, other: Kazakhstan 2008 (National Statistical Agency)

Figure 5: Trade Volume with Russia

3.4.2 Other Impacts

(1) Impacts on the Natural Environment

Radiation contamination was found in the embankment of the entrance to the Khromtau City in December 2003 during the sanitation survey of the road section Shymkent – Samara. The restricted area was established promptly and measurements of exposure to radiation

were conducted for the residents in the area, and no exceeding of the permissible rate was observed. Radioactive wastes were promptly collected, treated and buried by specialists of the National Nuclear Centre of Kazakhstan and the local company. According to the executing agency, no exceeding of the permissible rate was observed in measurements of exposure to radiation conducted afterwards and other negative impacts on natural environment have not been observed. While detailed information on Environmental Monitoring and Environmental Impact Assessment (EIA) was not available, necessary measures were taken, according to the executing agency.

(2) Land Acquisition and Resettlement

Neither land acquisition nor resettlement was required for the project.

From the above, the overall goal as contribution to regional development has mostly been achieved.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

The state-owned company under the Ministry of Transport and Communications called Kazakhavtodor is responsible for O&M of roads in Kazakhstan. Types of maintenance are classified as follows; 1) maintenance (removing snow, watering, and planting etc), 2) routine repair (fixing small cracks, road signs, and fences etc), 3) medium repair (fixing the surface of roads/overlay etc), 4) major repair (removing the surface of roads and laying new surface etc), and 5) reconstruction (widening roads and changing the alignment of road surface etc). 1) maintenance, 2) routine repair, traffic counts and a survey on traffic accidents are carried out by Kazakhavtodor, and the rest (3 to 5 above) are carried out by competitive bidding.

Kazakhavtodor has the headquarters in Astana and 16 branches (one in each oblast), and each oblast branch has several depots. The number of employees of Kazakhavtodor in total is 3,655, and the table below shows the numbers of depots and employees of Kazakhavtodor as a whole and of each branch.

Table 8: The Number of Depots and Employees of Kazakhavtodor

	The Number of Employees	The Number of Depots	The Number of Staff in Charge of Road Sections Covered by the Project
Kazakhavtodor	3,655	80	-
Aktyubinsk Oblast	251	5	85 (462km)
West Kazakhstan Oblast	174	4	35 (303km)
Atyrau Oblast	130	4	27 (189km)

Source: answer to questionnaire

The length of road maintained by one staff is about 5km in Aktyubinsk Oblast, about 9km in West Kazakhstan Oblast, and about 7km in Atyrau Oblast, all of which are within the planned level (about 10km) at the time of appraisal, and no major problem has been observed in the structure of O&M.

3.5.2 Technical Aspects of Operation and Maintenance

The table below shows educational levels of employees of Kazakhavtodor oblast branches.

Table 9: Educational Levels of Employees of Kazakhavtodor Oblast Branches

	Total Number of Employees	High Education	Special Secondary Education	Vocational Training	Other
Aktyubinsk Oblast	251	53	15	87	96
West Kazakhstan Oblast	174	32	15	11	116
Atyrau Oblast	130	15	7	10	98

Source: answer to questionnaire

The number of trainees who attended trainings on O&M in Aktyubinsk Oblast is 12 in 2008, 2 in 2009, and 3 in 2010. The number in West Kazakhstan Oblast is 2 in 2008, 14 in 2009, and 16 in 2010. The number in Atyrau Oblast is 8 in 2008, 6 in 2009 and 2 in 2010. As explained above, since Kazakhavtodor is responsible for maintenance and routine repair only, there seems to be no major problem regarding the number of engineers and/or technicians, however, the number of trainees above are small in all oblasts and themes of trainings are limited to the usage of O&M equipments and facilities. In the interviews with oblast branches during the field survey, some staff raised requests for provision of trainings on how to remove snow without damaging embankment of roads and new O&M techniques.

Apart from the above, consulting services for strengthening O&M capabilities were provided in this project from January 2002 to July 2003. While there are many O&M manuals and guidelines prepared by the Government of Kazakhstan and research institutes, the manual prepared as a training material by the consultant team was kept in none of the oblasts. In addition, the current trainings provided by Kazakhavtodor and other domestic institutions focus on the usage of O&M equipments and facilities only. All of these suggest that sustainability of the training program provided as part of consulting services is not very high.

3.5.3 Financial Aspects of Operation and Maintenance

Revenue of Kazakhavtodor is only the Government budget allocation and there is no toll revenue. Fuel levies and transit taxes are absorbed into general account of the Government, and these are not used for funding sources for roads. Tables below show the actual allocation of

Government budget for Kazakhavtodor, budget allocation to oblast branches and actual O&M cost of the road sections covered by the project.

Table 10: Government Budget Allocation to Kazakhavtodor

(Unit: million USD)

Year	2006	2007	2008	2009	2010
Amount	35	47	50	53	63

Source: answer to questionnaire
Note: Exchange Rate: 1USD=145KZT
Above figures are for maintenance and routine repair only.

Table 11: Budget Allocation to Oblast Branches and O&M Cost

(Unit: million USD)

Year	2006	2007	2008	2009	2010
Budget for Aktyubinsk Oblast (1,864km in total)	2.4	3.1	4.4	4.2	4.8
O&M Cost for Project Section (462km)	N/A	N/A	N/A	0.3	0.7
Budget for West Kazakhstan Oblast (1,287km in total)	1.8	2.2	2.4	2.5	2.7
O&M Cost for Project Section (303km)	N/A	N/A	0.3	0.3	0.4
Budget for Atyrau Oblast (990km in total)	1.1	2.0	1.9	2.3	2.4
O&M Cost for Project Section (189km)	N/A	N/A	0.3	0.3	0.3

Source: answer to questionnaire
Note: Exchange Rate: 1USD=145KZT

While 150 million USD was estimated to be required for maintenance of major roads in Kazakhstan at the time of appraisal[7], in practice only one third of the amount has been allocated for maintenance. According to Kazakhavtodor HQ, only 30% of requested amount has been actually allocated (a large amount of budget has been allocated for road construction and amount allocated for maintenance has been small). Moreover, according to oblast branches, necessary O&M equipments cannot be purchased due to the lack of budget.

On the other hand, an introduction of Public Private Partnership (PPP) to road maintenance is currently considered in Kazakhstan, and an introduction of a toll system is also being considered as part of PPP (this is to introduce a concession contract in which contractors conduct O&M of roads after rehabilitation by collecting tolls). It is quite unlikely that PPP will be instantly introduced in the road sections covered by the project, considering the traffic volume of these sections, however, it is expected to improve budget deficit for O&M for roads in Kazakhstan at a national level, by utilizing a new system such as PPP.

[7] Source: SAPROF Table 7.3.2

3.5.4 Current Status of Operation and Maintenance

Several depots of Kazakhavtodor oblast branches were visited during the field survey, and O&M equipments of West Kazakhstan oblast were particularly old and deteriorated, and staff of the depot was using these equipments by repairing them.

Deteriorated O&M Equipments

The ex-post evaluation team travelled 1) about 20km of the Aktyubinsk – Khromtau section, 2) the whole Atyrau – Mahambet section (67km), and 3) the whole Chapaev – Uralsk section (123km) during the field survey, and some cracks were found on the No. 1 section. According to standards of Kazakhstan, medium repair is to be conducted after four to five years of construction and/or rehabilitation, and this was already conducted for the No. 2 and 3 sections in 2009 and 2010, and thus there was no problem on road surface of these sections. According to the Aktyubinsk oblast branch, medium repair for the No.1 section is planned to be conducted in 2011.

Some problems have been observed in terms of insufficient amount of financial resources for O&M; therefore sustainability of the project is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Relevance of this project is high, as the project is consistent with priority areas of Kazakhstan's development plans and Japan's ODA policy, and moreover development needs for the project are high. Efficiency of the project is fair, as the actual project cost exceeded the plan while actual project period was reasonable taking into account the large increase of outputs. Effectiveness of the project is high, as the project more or less achieved targets in major operation and effect indicators, and the overall goal of the project, which is to contribute to regional development, has also been mostly achieved. Sustainability of the project is fair, as some problems have been observed in terms of financial status of the O&M agency and insufficient number of maintenance equipments, while no major problems have been observed in the O&M system and technical capacity.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) (Recommendation to the Executing Agency) Currently the Government of Kazakhstan is attempting to adopt PPP in O&M of roads and toll system is also considered to be adopted as part of PPP. It is quite unlikely that PPP will be instantly introduced in the road sections covered by the project, considering the traffic volume of these sections, however, budget deficit for O&M for roads in Kazakhstan should be improved at a national level, by utilizing a new system such as PPP.

(2) (Recommendation to the Executing Agency, Traffic Police and National Road Safety Commission) Awareness should be increased among drivers through education against speeding and drunk-driving (at the timing of license renewal etc) and speeding control should be strengthened in order to decrease the number of traffic accidents in cooperation with traffic police and the National Road Safety Commission.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

(1) At the time of appraisal there was a concern about the lack of O&M budget and deteriorated equipments, and both F/S and SAPROF proposed to include provision of O&M equipments into the project scope. Procurement and replacement of O&M equipments should be included in a project scope when necessary in order to enhance sustainability of a project. However, this should be accompanied by support for developing measures (financial measures in particular) that enable the executing agency to maintain and upgrade equipments independently in a long term.

(2) EIRR was to be calculated based on benefits derived from savings in VOC materialized by the project (savings of VOC are to be calculated by deducting VOC after the project from VOC before the project, according to IRI of each section of road). However, EIRR cannot be calculated as IRI is not used for O&M of roads in Western Kazakhstan and necessary data for the calculation could not be collected. When selecting indicators to measure effectiveness of a project, indicators that are common in a recipient country should be selected or provision of necessary equipments and training should be included in a project scope.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	[Atyrau – Uralsk] ・ Length: 492km ・ Rehabilitated Length: 252km ・ Pavement: Asphalt ・ Reconstruction of Bridge: 6 ・ Repair of Bridge: 14 ・ Concrete Pipe Culvert: 1,715m ・ Concrete Box Culvert: 86m ・ Bus Shelter:28 [Kostanai border – Aktyubinsk] ・ Length: 462km ・ Rehabilitated Length: 326.5km ・ Pavement: Asphalt ・ Reconstruction of Bridge: 4 ・ Repair of Bridge: 17 ・ Concrete Pipe Culvert: 2,360m ・ Concrete Box Culvert: 30m [Consulting Service] Foreign: 281M/M, Local: 737M/M	 ・ Same as left ・ 488km ・ Same as left ・ As planned ・ As planned ・ 1,528m ・ 100m ・ 47 ・ Same as left ・ 444km ・ Same as left ・ 6 ・ 15 ・ 3,040m ・ 40m Foreign: 225M/M, Local:1,709M/M
2. Project Period	December 2000 – July 2005 (56 months)	December 2000 – December 2005 (61 months)
3. Project Cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 10,155 million yen 11,897 million yen 22,052 million yen 16,539 million yen 1USD = 105.97 yen (As of October 1999)	 Unknown Unknown 49,864 million yen 16,415 million yen 1KZT = 0.87 yen (Average between December 2000 and April 2008)

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan Project
Gansu Province Road Construction Project

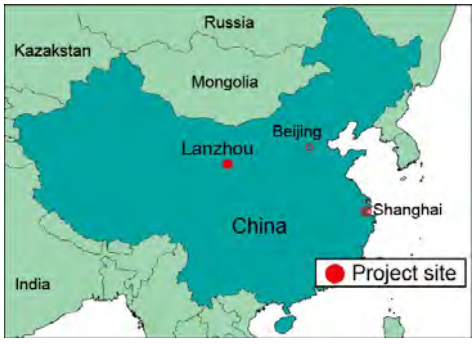
External Evaluator: Yasuhiro Kawabata, Sanshu Engineering Consultant

0. Summary

The objective of this project was to improve the accessibility to markets and promote the regional development by constructing an expressway and improving a rural road in Gansu Province, thereby contributing to the people's living environment and poverty alleviation in the inland region. The project has been highly relevant with the Chinese development plan and needs, as well as Japan's ODA policies. Since the project cost and period were within the plan, the efficiency of the project is therefore considered high. The project's effectiveness is also considered high because it has largely achieved its development objective - improvement of the accessibility to markets and promotion of regional development - and it has contributed to the people's living environment and poverty alleviation in the inland region. Furthermore, since there were no major problems observed in the operation and maintenance system, sustainability of the project is also considered high.

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

1. Project Description



Location of Project Site

Liuzhaike-Baiyin Expressway at Baiyin

1.1 Background

The Chinese government has promoted the transport infrastructure development, including railway, port and highway sectors, which has been considered an obstacle in the country's economic growth according to the development plans since the reform and open-door policies commenced in early 1980's. Particularly in the highway sector, the total length of the highway

network has reached 1.4 million km in 2000, which is about 1.6 times of that in 1980 (880,000 km). The share of transport by roads/highways among all the transport modes has become larger. In the 1980s, 32% of passenger transport was highway transport. Highway transport has become the highest mode, overtaking railway transport in 1990's, and has reached more than half (54.3%) in 2000.

However, the highway network in inland regions, which geographically occupies about 90% of the whole nation, has been underdeveloped. The highway density in inland regions as of 2000 was 0.11 km/㎢, which was about one fourth of that in the coastal regions. The discrepancy in the highway network development between regions was substantial. Thus, problems, including constraints in access to markets and worsening of the transport efficiency, have been noted.

Gansu is located in the region surrounded by three plateaus (Loess Plateau, Mongolia, and Qinghai-Tibet plateaus), and its population was about 26.35 million as of 2009. Although Gansu's economy has been growing, the GDP per capita as of 2009 was 12,856 yuan, about half the national average (25,511 yuan). The transport sector development in Gansu has lagged behind because of the harsh natural environment and financial constraints and it has been an obstacle for the Province. The highway density as of 2000 was only 0.09km/㎢, and the share of high-grade highways among the highway network was about 9%, which was considered low. It was expected that the traffic demand along the project corridor would further expand due to the economic growth and development of motorization. Thus, the highway development, which would contribute to the increase in income for the poor, was urgently needed.

1.2 Project Outline

The objective of this project was to improve the accessibility to markets and promote the regional development by constructing an expressway and improving a rural road in Gansu Province, thereby contributing to the people's living environment and poverty alleviation in the inland region. The location of the project site is shown in Figure 1.

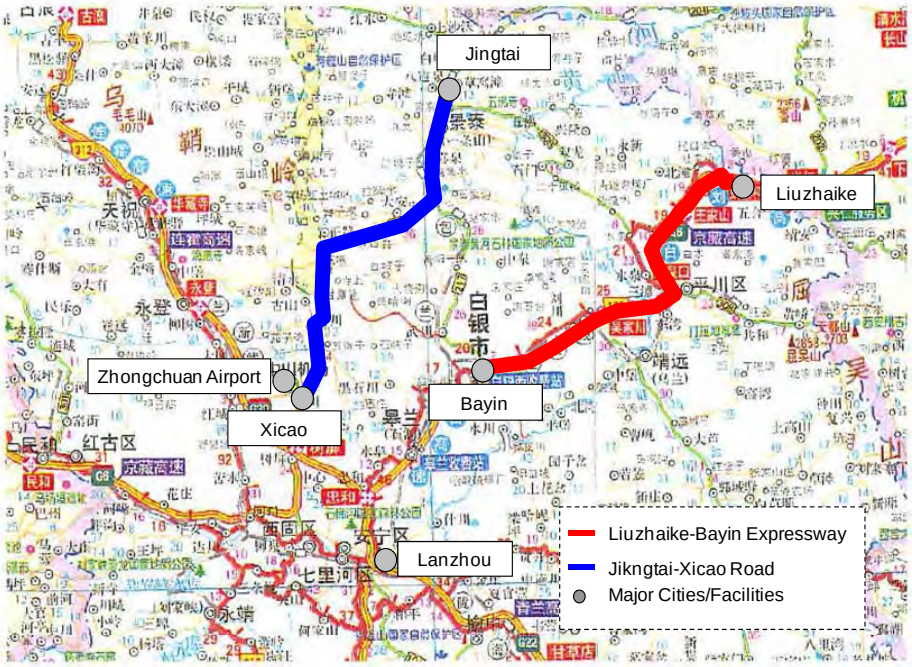


Figure 1 Location of the Project Site

Approved Amount/Disbursed Amount	20,013 million yen/ 18,419million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2002/ March 2002
Terms and Conditions	Interest rate 2.20%; Repayment period 30 years (Grace period 10 years) ; Conditions of procurement: General Untied, Consultant: Interest rate: 0.75%; Repayment period 40 years (Grace period 10 years) , Conditions of procurement: Bilateral tied
Borrower/Executing Agency	Government of People's Republic of China/ Gansu Provincial Government (Gansu Changda Highway Company Ltd.)
Final Disbursement Date	July 2008
Main Contractor (over 1 billion yen)	1st Engineering Co. of 1st Highway Engineering Bureau of China (China) / Gansu Provincial Highway Engineering General Co. (China) / Gansu Tiandi Road & Bridge Engineering Co. Ltd (China) / Gansu Wuhuan Highway Engineering Co. Ltd (China) / Gansu Wuhuan Highway Engineering Co. Ltd (China) / Longjian Road & Bridge Ltd. Co. (China) / RBG 1st Engineering Sub of 2nd Highway Engineering Bureau (China) / Shengyang High Road Building Co. (China) / The 2nd Engineering Co. Ltd. of China Tiesiju Civil Engineering(China) / The 3rd Engineering Co. Ltd. of the 12th Group pf CRCC(China) / Yueyan Road & Bridge Construction Co. (China)
Main Consultant (over 100 million yen)	Pacific Consultants International (Japan)

Feasibility Studies and etc.	F/S of Liuzhaike-Baiyin Expressway Construction Project (Gansu Provincial Transport Planning, Supervision and Design Institute, June 2000) , F/S of Jingtai-Xicao Rural Road Construction Project (Gansu Provincial Transport Planning, Supervision and Design Institute, February 2001)
Relevant Projects	Training on the Gansu Road Maintenance (Training by Subject under Loan Account Technical Assistance, implemented in 2009) Tri-Provincial Highway Project by the World Bank, 1998

2. Outline of the Evaluation Study

2.1 External Evaluator

Yasuhiro Kawabata, Sanshu Engineering Consultant

2.2 Duration of Evaluation Study

The subject ex-post evaluation assignment was implemented as follows:

Duration of the Study : October 2010 to October 2011

Duration of the Field Study : January 9-21, 2010 and April 3-15, 2011

3. Results of the Evaluation (Overall Rating: A[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance with the Development Plan

China's 10th Five-Year Plan (2001-2005) states that the government would address the following three agenda in the highway transport sector: 1) development of the National Trunk Highway System (comprising 12 major highways spread out all over the country with a total length of 35,000 km); 2) development of the highway network (expand the country's network from 1.4 million km with the highway density of 0.15km/㎢ in 2000 to 1.6 million km with the highway density of 0.17 km/㎢ in 2005); and 3) establishment of the road transport service network. In December 2000, the Chinese government announced a "Note on policy measures regarding the Great Western Region Development by the State Council", in which four agenda, including the acceleration of the infrastructure construction, were recognized as priority agendas: 1) development of trunk highways; 2) improvement of rural roads; 3) development of linking road network; and 4) strengthening the fund raising mechanism.

Under Gansu's 10th Five-Year Plan, construction of major trunk highways comprising 12 routes is classified as a priority project. Improvement of rural and farm roads, that will provide benefits to poorer areas, would also be addressed as a part of the poverty alleviation

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

[2] ③ : High, ② : Fair, ① : Low

program according to the “Rural Roads and Road Poverty Alleviation Project”. Both Liuzhaike-Baiyin Expressway and Jingtai-Xicao Highway were included in the project that was classified as priority in the 10th Five-Year Plan and its implementation was consistent with the national and provincial policies and strategies.

China’s 11th Five-Year Plan (2006-2010) states that the government would address the following agenda regarding the highway transport sector: 1) further development of the expressway network; 2) establishment of the highway network; 3) development of the highway network involving national and provincial highways; 4) completion of inter -provincial highways; and 5) enhancement of the highway network efficiency.

Under Gansu’s 11th Five-Year Plan, the transport network development strategy was established to compete with the eastern regions. The short-term targets (by 2010) of the development strategy were to connect the provincial capital city and provincial cities with the expressway’s major interchanges, and to delete the missing links along the inter-provincial highways.

During appraisal and post evaluation, the development of the expressway network and improvement of the national and provincial highways were the priority agenda in the national and provincial development plans. Thus, the project is consistent with the national and provincial development plans.

3.1.2 Relevance with the Development Needs

The share of workers engaged in the first level industry at appraisal (2002) was high (60%) in northeastern Gansu, where the project is located and the main source of income were agricultural products. Although the second- and third- level industries existed mainly in Baiyin and Pinchuan districts in the same region, the level of income in the project corridor was low and the poor condition of infrastructure was an obstacle in its economic development. Under these circumstances, it was considered an essential and priority agenda to connect with the neighboring larger cities and arterial highways along the coast by developing the expressway network (improvement of accessibility) in order to promote the economic activities in inland regions. Thus, the project targeting to strengthen and improve the highway network in the northeastern region of the province was in accordance with its development needs.

Liuzhaike-Baiyin Expressway and Jingtai-Xicao Highway under the project are connected with Yinchuan of the Ninxia Hui Autonomous Region to the north and with Lanzhou of the provincial capital to the south. The project’s objective is consistent with the development needs of Gansu Province at post evaluation, aimed to speed up travel on highways toward other provinces, promote the development of prefectural/town roads and improve the farm roads.

The needs of the road/highway project in the target area were/are high at appraisal and at post evaluation.

3.1.3 Relevance with Japan's ODA Policy

In the Annual Report on the Implementation of Japan's ODA (1999), the aid policy towards China was to resolve the lagging infrastructure development, which includes transport, communications and power sectors, which was an obstacle in China's economic development, thus making it one of the priority sectors. Particularly in the transport sector, it was proposed to provide aid to projects that would increase transporting capacity by constructing transportation facilities and enhance the maintenance and management technology that would raise transportation efficiency.

According to the Overseas Economic Cooperation Implementation Policy (issued on December 1, 1999 and valid up to March 2002), the Japanese aid policy towards China focused on alleviation of disparity between regions, particularly giving priority to inland regions and to the development of the economic and social infrastructure that would promote self-motivating economic development to encourage the development of the private sector and democratic markets, and urge a well-balanced development to promote a market-oriented economy.

Accordingly, the project has been highly relevant with the Chinese development plan and needs, as well as Japan's ODA policies. Its relevance is therefore considered high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

The project outputs (original and actual) are summarized in Table1.

Table 1 Comparison of project outputs (Original and actual)

Item	Original	Actual
① Expressway Liuzhaike-Baiyin Expressway	• Length: 110km • Lanes: 4-lane both direction • Pavement: asphalt concrete • Bridges: about 40 units • Interchanges: 6 locations • Service areas: 2 locations • Toll stations: 7 locations • Electrical/Mechanical facilities (toll collection, communications, monitoring)	• Length: as planned • Lanes: as planned • Pavement: as planned • Bridges: 34 units • Interchanges: as planned • Service areas: as planned • Toll stations: 6 locations • Electrical/Mechanical facilities: as planned
② Rural Road Jingtai-Xicao Highway	• Length: 100km • Lanes: 2-lane both direction • Pavement: asphalt concrete • Bridges: about 14 units • Service areas: 2 locations	• Length: 102km • Lanes: as planned • Pavement: as planned • Bridges: as planned • Service areas: 1 locations
③ Consulting services	• Supervision 50 M/M • Overseas training 20 M/M	• Supervision: 36.6 M/M • Overseas training: as planned

Source: Replies to the Questionnaire

The number of toll stations on the Expressway has been changed from 7 to 6 because the Baiyin-Lanzhou section of the Expressway had been completed prior to the Liuzhaike-Baiyin Expressway, and since the subject expressway was directly connected with the Baiyin- Lanzhou section, hence the toll station at the starting point has been cancelled.

Among the originally planned two road-side stations (Michinoeki)[3] along Jingtai-Xicao Highway, a station (in Yongdeng county) was cancelled because it was determined that the demand would be low. The road side station in Jingtai was constructed, but it is used only as a depot since the concept of "Michinoeki" could not be applied to the subject project. The Executing Agency has been planning to utilize the facility more effectively.

Man-month (M/M) for construction supervision has been reduced due to short construction period and break in implementation during winter.

Liuzhaike-Baiyin Expressway
Baiyin East Service Area

Liuzhaike-Baiyin Expressway
Crossing over Yellow River

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost estimated at appraisal was 45.627 billion yen (of which the Japanese ODA loan amount was 20.013 billion yen and used for the foreign currency portion, and the rest were funded by the central government and Gansu Province). The actual total project cost was 38.926 billion yen (of which the Japanese ODA loan amount was 18.419 billion yen and the rest were locally funded), which was within the planned cost, or equivalent to 85% of the planned project cost. In terms of local currency (Chinese yuan), the actual cost was 87% of the planned

[3] A rest area installed along the ordinary highway corridor is the facility which provides information on culture, history, tourist spots, and souvenirs along the corridor, and intends to serve as the core of the surrounding vicinity and activate the local community and promote the regional linkage though a road.

cost. The main reasons for the discrepancy were: 1) the Japanese yen appreciated by 9% against the Chinese yuan; 2) lower expressway construction cost was caused by high bidding competition and the contract price was lowered by 40%. However, after commencement of work, the construction cost was raised because high quality materials were for asphalt and crushed stones instead of earth for base materials, and provision of side ditches along the corridor (both sides). As a result, the construction cost was reduced by 10%; 3) increase in rural road civil work was caused by design variations, which were needed to cope with the topography and demand along the corridor; 4) the cost of electrical and mechanical facilities was reduced because the number of the toll booths at toll stations was reduced by half due to less than projected traffic volume. In addition, although the cost of imported facilities were estimated at the planning stage, less expensive local products were used at the implementation stage; 5) lower foreign currency portion for consulting services due to shorter construction period and break of implementation during winter. Employment of a local consultant was not initially considered. However, due to the mandate of Communications Department, a local consultant was hired and the cost was added; 6) taxes and management costs were over-estimated at the planning stage; and 7) cost increase in land acquisition (for an expressway) occurred because the payment was made based on the national and provincial standards and rules after a detailed investigation (items and quantity) was conducted in the field.

Liuzhaike-Baiyin Expressway
Liuzhaike Toll Station

Jingtai-Xicao Highway
Beginning Point (Xicao)

3.2.2.2 Project Period

The project period was shorter than planned. The planned project period was from March 2000 (L/A signing month) to May 2006 (project completion) for a total period of 51 months. While the actual project period was from March 2002 (L/A signing month) to December 2005 (opening of the expressway) for a total period of 46 months, or equivalent to 90% of the planned period. Construction of the rural road main carriageway was completed in December 2003. However, a road side station (*Michinoeki*) was completed in 2007.

The Expressway was open to traffic on December 16, 2005, three months earlier than planned. However, if compared with the originally defined project completion date (all works, including electrical and mechanical facilities), the completion date of electrical and mechanical facilities was June 2007, thus the implementation was delayed by about one year. Improvement work of the rural road commenced one year earlier than planned. Procurement of maintenance equipment was delayed by two years; it commenced after the condition of the existing equipment was checked and the demand was clarified upon completion of an expressway. However, no major issue has been observed.

Accordingly, both the project cost and period were within the plan. Hence, efficiency of the project is considered high.

3.3 Effectiveness[4] (Rating: ③)

3.3.1 Quantitative Impacts

3.3.1.1 Results from Operation and Effected Indicators

(1) Expressway

① Average Daily Traffic

The Average Daily Traffic (ADT) of Liuzhaike-Baiyin Expressway is shown in Table 2.

Table 2 Average Daily Traffic

unit: vehicle/day

	2000 Base year	2006	2007	2008 2 years after completion	2009
Projected		11,400	12,400	13,300	14,400
Actual	9,100	4,600	5,800	7,100	10,000

Source: Appraisal documents and Replies to the Questionnaire

The Average Daily Traffic (ADT) of National Highway 109, which is parallel to Liuzhaike-Baiyin Expressway, is shown in Table 3.

Table 3 Average Daily Traffic on National Highway 109

unit: vehicle/day

	2000 Base year	2006	2007	2008 2 years after completion	2009
Actual	5,000	6,000	4,600	4,200	3,500

Source: Replies to the Questionnaire

Currently, the actual traffic volume on the expressway is not high as expected. However, the traffic growth rate of the expressway for the past three years is about 30% and the

[4] The rating of the project's effectiveness takes into account the evaluation of the project's impact.

traffic volume has been largely increasing. On the other hand, the traffic volume on the existing parallel road has been decreasing since the opening of the expressway, and thus it is considered that diversion from the existing road to the expressway has been progressing. The projected traffic volume at the opening of the expressway in the feasibility study was about 11,000 vehicles /day and thus, it was considered that the financial viability of the expressway would be low as a toll highway. The development objective of the proposed expressway was to contribute to the poverty alleviation through promoting the regional development by improving the accessibility in the inland poor areas and consequently enhancing the expressway network. Thus, the comparison between the projected traffic volume and the actual traffic volume does not make a sense so much. However, with the further enhancement of the expressway network and the development of the regional economy, it is expected that the traffic volume would reach the traffic volume projected at the feasibility stage within a few years.

② Travel Time (whole stretch)

The travel time along the subject expressway is shown in Table 4.

Table 4 Travel Time (Liuzhaike-Baiyin)

unit: minutes

	2000 Base Year	2006	2007	2008 2 years after completion	2009
Projected				81	
Actual	174	81	81	81	81

Source: Appraisal documents and Replies to the Questionnaire

Upon completion of the expressway, the travel time between Liuzhaike and Baiyin was reduced by half, contributing to the improvement in accessibility to markets and promoting the regional development.

③ Traffic Accidents (number)

The traffic accidents on the expressway are shown in Table 5.

Table 5 Traffic Accidents

unit: number/year

	2000 Base Year	2006	2007	2008 2 years after completion	2009
Projected		140	154	167	179
Actual	293	132	121	131	124

Source: Appraisal documents and Replies to the Questionnaire

Note: The actual number in 2009 is the number of traffic accidents on the existing National

Highway 109, while those after the opening of the expressway are the actual number of traffic accidents on the expressway.

Although the traffic volume has doubled since the opening of the expressway, the number of traffic accidents has decreased by about 60%, indicating that the expressway is safer.

3.3.1.2 Results from Operation and Effected Indicators

(1) Rural Road

① Average Daily Traffic

The Average Daily Traffic on Jingtai-Xicao Highway is shown in Table 6.

Table 6 Average Daily Traffic

unit: vehicle/day

	2000 Base Year	2005	2006	2007	2008 2 years after completion	2009
Projected			5,100	5,450	5,800	6,200
Actual	4,750	4,800	3,700	3,700	3,800	4,500

Source: Appraisal documents and Replies to the Questionnaire

Although the actual traffic volume has not reached the level projected at the planning stage, the traffic growth rate from 2008 to 2009 is 18%, indicating that traffic is increasing.

② Travel Time

The travel time between Jingtai and Xicao is shown in Table 7.

Table 7 Travel Time

unit: minutes

	2000 Base year	2004 Completion Year	2006	2007	2008	2009
Projected		95				
Actual	166	60	60	60	60	60

Source: Appraisal documents and Replies to the Questionnaire

With improvements (i.e., paving and reconstruction of bridges) in the existing road, driving speed has increased, resulting in substantially shorter travel time by about one third.

③ Traffic Accidents (number)

The traffic accidents on rural road are shown in Table 8.

Table 8　Traffic Accidents

unit: number/year

	2000 Base Year	2006	2007	2008 2 years after completion	2009
Projected		87	109	114	128
Actual	133	68	82	76	58

Source:　Appraisal documents and Replies to the Questionnaire

Jingtai-Xicao Highway
Rolling Region

Jingtai-Xicao Highway
Project Ending Point (Jingtai)

Improvements in road surface have reduced traffic accidents, as well as damage to vehicles.　As a result, accessibility to markets has improved.

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

(1) Financial Internal Rate of Return (FIRR)

Since data on the toll revenue and operation/maintenance costs for the past five years was provided, the FIRR at post evaluation was calculated based on several assumptions on future revenue and costs made by the evaluator.　FIRRs at appraisal and at post evaluation are shown in Table 9.

Table 9　FIRR at Appraisal and Post Evaluation

	At appraisal	At post evaluation
FIRR	6.2%	4.8%

Since the actual traffic volume is less than projected, the FIRR at post evaluation is lower than expected.

(2) Economic Internal Rate of Return (EIRR)

Since the data needed to calculate the EIRR at post evaluation for the Liuzhaike-Baiyin Expressway was not available, it was difficult to calculate the EIRR. Only EIRR for

Jingtai-Xicao Highway was calculated with the following assumptions: 1) construction and maintenance costs were considered as “cost”; 2) savings in vehicle operating costs and travel time, and reduction in traffic accidents were considered “benefits”; and 3) project life was twenty years. The EIRR at post evaluation (19.4%) was slightly lower than at appraisal (22.3%). The reasons for lower EIRR were due to increase in the construction cost (2,885 million yen) compared to planned cost (2,577 million yen); and the actual traffic volume was lower than planned.

3.3.2 Qualitative Effects

Regarding qualitative effects, the promotion of regional development and poverty alleviation were considered.

(1) Promotion of Regional Development

Accessibility to markets has improved due to substantial reduction in travel time on the expressway and the rural road. Consequently, the development zones, including “China Science Institute High-tech Industrial Park”, “Western District”, “Pinchuan Central District” and “Liuchuan Industrial Zone” have been constructed along the expressway corridor. Moreover, since the driving time to the provincial capital, Lanzhou, became less than an hour, the area surrounding Lanzhou has been developed into an economic zone. The circumferential economic industrial zone along the rural road has also been developed around Xicao, and the factory of Geely Motors and Qinwangchuan Agricultural High-tech Model Base has been established. Thus, it was concluded that the project has contributed to the promotion of the regional economy.

(2) Poverty Alleviation

According to the Executing Agency, since the opening of the Expressway to the public, the migration of population along the corridor has been increasing, whereas the supply of agricultural and husbandry products has become insufficient. Consequently, the prices of these products went up which encouraged farmers to be more involved in the farming and plantation business. As a result, the income of farmers increased. Furthermore, the increasing consumer demand, development of the regional economy, as well as enhancement in living standards, the commercial business has become more active by increasing the number of supermarkets from one to seven, with a total sale of more than one million yuan.

The project has largely achieved its development objective, therefore its effectiveness is considered high.

3.4 Impact

3.4.1 Intended Impacts

Since the opening of the expressway, accessibility to urban cities, including Lanzhou has substantially improved, and the industries along the corridor have been developed further. The farming and commercial business have been further promoted and the income of residents and farmers along the corridor has gone up. These facts are supported by figures (GDP/capita/year). The GDP/capita in 2009 for Jingyuan county near Lanzhou was about six times more than in the base year 2000, about three times the projected figure. The GDP/capita in 2009 for Pinghe prefecture, located at the project ending point, was about double of that in the base year 2000, close to the projected figure. The growth rate of GDP/capita of the Chinese average (from 2000 to 2009) was about 3.5 times. The inflation rate during the same period was about 2%/year.

Table 10 GDP/capita/year along the Expressway Corridor

unit: yuan

	2000 Base Year	2006	2007	2008 2 years after Completion	2009
Projected					
JingyuanPinghe		2,070 8,658	2,215 9,458	2,399 10,258	2,590 11,206
Actual					
JingyuanPinghe	1,331 5,198	5,445 8,868	6,080 9,643	6,753 10,346	7,628 11,786
Population					
Jingyuan		461	462	465	467
Pinghe		194	194	195	196
(in 0,000)					

Source: Appraisal documents and Replies to the Questionnaire

The actual shipping volume of agricultural products, three years after the opening of the expressway, is much larger than the projected volume. (See Table 11)

Table 11 Agricultural Products along the Expressway Corridor

unit: 0,000 tons/year

	2000 Base Year	2006	2007	2008 2 years after Completion	2009
Projected					
Jingyuan		9.41	10.22	11.03	11.99
Pinghe		5.80	6.29	6.77	7.33
Actual					
Jingyuan	5.84	5.03	8.37	10.28	14.40
Pinghe	3.65	3.35	5.58	6.85	9.60

Source: Appraisal documents and Replies to the Questionnaire

Since the completion of the improvement work for Jingtai-Xicao Highway, the number of traffic accidents has decreased. Because of the improvement in accessibility for the residents along the corridor and expansion of business activities, the impact on the regional economy by the project became visible. The GDP/capita in 2009 for Yongdeng county near Lanzhou was about 3.5 times of that in the base year 2000, about double the projected figure. The GDP/capita in 2009 for Jingtai prefecture, located at the project ending point, was about six times of that in the base year 2000, about 3.5 times the projected figure.

Table 12 GDP/capita/year along the Jingtai-Xicao Highway Corridor

unit: yuan

	2000 Base Year	2006	2007	2008 2 years after Completion	2009
Projected					
Yongden		4,792	5,158	5,523	5,945
Jingtai		2,581	2,766	2,950	3,161
Actual					
Yongden	3,191	7,730	7,973	10,236	11,582
Jingtai	1,750	7,716	7,890	8,230	10,924
Population					
Yongdeng		530	531	533	540
Jintai		231	234	235	238

Source: Appraisal documents and Replies to the Questionnaire

Upon completion of the improvement work, the actual shipping volume of agricultural products is larger than the projected volume.

Table 13 Agricultural Products along the Jingtai-Xicao Highway Corridor

unit: 0,000 tons/year

	2000 Base Year	2006	2007	2008 2 years after Completion	2009
Projected					
Yongdeng		6.86	7.38	7.89	8.49
Jingtai		8.10	8.72	9.33	10.04
Actual					
Yongdeg	4.38	7.21	8.20	7.99	9.32
Jingtai	5.11	8.54	9.21	9.87	11.32

Source: Appraisal documents and Replies to the Questionnaire

3.4.2 Other Impacts

(1) Impacts on the natural environment

According to the Executing Agency, about three fourth of trucks hauling coals on the existing road (National Highway 109) and two third of long-distance cargo trucks traveling between Lanzhou, provincial capital of Gansu and Yinchuan of Ningxia, have diverted to the expressway, and thus reduced traffic noise and air/water pollution. Given that the

roadway is far from residential areas, traffic noise has declined, and traffic laws have been strictly enforced on vehicle violations (i.e., overloading, oversized and other illegal vehicles) at toll stations, there have been no major environmental issues observed.

On the rural roads, the environmental protection and management were implemented as planned during the implementation and dialogue with local citizens was maintained. Furthermore, speed bumps and traffic signs were installed, hence no major issues have been observed.

(2) Land Acquisition and Resettlement

Since the beneficiary survey was not conducted by the evaluation team, all the data and information on the land acquisition and resettlement was collected through the interviews with the Executing Agency. The actual land area acquired for the expressway construction was a total of about 423 ha, including 189 ha rice paddies, 205 ha fields, and 29 ha other use. The number of resettled houses and habitants was 99 households, with 542 persons. The actual figures of land area and resettled houses/people were less than the planned. However, the cost for land acquisition and resettlement compensation has increased (152.67 million yuan). The reason for the increase was that the estimated cost was the same as the preliminary cost used for the feasibility study at the planning stage.

The actual land area acquired for the rural highway was a total of about 135 ha, about the same as planned. The number of resettled houses and habitants was 68 households, with 414 persons, less than planned. Regarding the land acquisition cost for the rural highway, the budget estimated at the planning stage was paid to the local governments along the corridor at the commencement of the project, while the land acquisition and compensation business was entrusted to the local governments. Thus, there were no discrepancy between the estimate and the actual payment amount (21.67 million yuan).

(3) Other Impacts (Positive or negative impacts)

The opening of the expressway made the travel time between towns/regions shorter, thus it strengthened the linkage between regions and promoted exchanges of people. At the Wangjiashang town, which is located close to the border with Ningxia, and where the weather condition is harsh, there was only one regular bus operation per day before the project. However, upon completion of the project, the number of bus operations increased to 10 or more operations per day, making accessibility to Baiyin, the major city around the region and Pinchuan, to substantially improve. The job employment created for the poor within one year after the project completion is about 80 posts. In addition, about 100 staff has been employed in charge of maintenance work and about 190 staff as toll attendants.

Therefore, it was likely that the project has contributed to the people's living environment and in poverty alleviation in the inland region.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

At the opening of the expressway (December 2005), Gansu Changda Highway Company Ltd. was responsible for operation and maintenance of the expressway, as originally planned. However, in January 2007 the institutional reform on the operation and management system for high-grade highways in Gansu was carried out. Since then, the High-Grade Highway Operation and Management Center of the Gansu Communications and Transport Department (about 3,300 staff) has been in charge of operations of Liuzhaike-Baiyin Expressway and Baiyin Road Maintenance Office (about 1,000 staff) under the Department's Highway Bureau (about 16,000 staff) in charge of maintenance. The operation and maintenance work for the expressway has been implemented according to the "Gansu Province Expressway Management Code", which was enacted on July 1, 2008.

The Department's Highway Bureau is responsible for the maintenance work for Jingtai-Xicao Highway as well. However, the actual work in the field has been undertaken by its district offices (Baiyin Road Maintenance Office and Lanzhou Road Maintenance Office (about 1,400 staff).

3.5.2 Technical Aspects of Operation and Maintenance

Among the staff working at the Highway Bureau (about 200 staff), 49 are technical staff. By category of the professional title, 35 are Senior Engineers, and 14 Engineers. By category of the educational background, 7 are Master's degree holders, 30 Bachelor's degree holders and 12 are non-degree holders. In order to enhance the professional and technical capacity of staff in charge of maintenance work, various training programs on modules, including bridge maintenance/management, road surface repair, and slope protection have been regularly implemented. In 2010, 13 training programs were conducted. Required training programs have also been regularly provided to technicians who are in charge of the field maintenance work, assigned to the District Road Maintenance Office. Regarding the operation and maintenance of the expressway, under the principle that once a highway was completed, the network function would be further enhanced; the renewal of technology to introduce effective traffic operation, including installation of the electronic toll collection system, has been continuously made.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Liuzhaike-Baiyin Expressway

The revenue and expenditures of Liuzhaike-Baiyin Expressway for the past five years is shown in Table 14.

Table 14 Revenue and Expenditures of Liuzhaike-Baiyin Expressway

unit: million yuan

	Net income	Operation expenses	Maintenance expenses	Profit
2006	65.2	4.2	9.9	51.1
2007	81.9	4.5	8.7	68.7
2008	100.5	4.8	10.8	84.9
2009	140.9	5.0	17.6	118.3
2010	170.8	5.5	22.6	142.7

Source: Replies to the Questionnaire

The above table does not include other cost items such as administration, financing, and taxes, therefore the profit does not necessarily reflect the balance status by operation of the expressway. Since the High-Grade Highway Operation and Management Center is currently operating expressways in Gansu Province, including Liuzhaike-Baiyin Expressway, the Center monitors the revenue and expenditures of the total expressway network. Currently, the system has been established, whereas the toll revenue has been pooled, so that once toll revenue is insufficient, they receive subsidy from the Province.

As four years have passed since the expressway was open to traffic in December 2005, rutting and sagging have been observed. The Highway Bureau has budgeted 115.59 million yuan for maintenance work and has been implementing the repair work during 2010 and 2011.

(2) Jingtai-Xicao Highway

The budget for road maintenance for Jingtai-Xicao Highway for the past three years is shown in Table 15. The data on the budget by road was not available.

Table 15 Budget for Road Maintenance of Jingtai-Xicao Highway (Spent)

unit: million yuan

Year	Expenditure
2008	99.79
2009	159.61
2010	174.48

Source: Replies to the Questionnaire

The standard budget allocations for maintenance work of rural roads are 1,500 yuan/km/year for routine maintenance work (for national and provincial roads) and 7,000

yuan/km/year for repair work (large and medium size repair and rehabilitation). During the visual inspection in the field, there were no cracks on the pavement surface and deposit/debris in the side ditches were observed, and thus it was considered that the maintenance budget has been properly distributed.

3.5.4 Current Status of Operation and Maintenance

Regarding the maintenance of the expressway, since 2008 the High-Grade Highway Repair and Management Center of the Baiyin Road Maintenance Office has purchased maintenance equipment, including an asphalt mix plant, road sweepers, and road rollers; and has organized task teams who would be responsible for daily patrol, surface repair, bridge rehabilitation and repair of traffic safety facilities (signs, guard-rails, and others). The repair work has been specialized and mechanized and more efforts have been made on the maintenance of surface and slopes. As a result, the expressway has remained in a good shape.

Baiyin Road Maintenance Office and Lanzhou Road Maintenance Office are responsible for maintenance of Jngtai-Xicao Highway. The highway is in good shape because routine maintenance work, including removal of obstacles on the road surface, simple repair of road surface, and rehabilitation of side ditches are regularly undertaken. The well-maintained road surface was observed during the field inspection. Regarding the repair work, with the estimated contract price exceeding one million yuan, contractors have been selected through the competitive bidding procedure according to the “Guidelines for Procurement of Road Repair Civil Work”.

Since no major problems have been observed in the operation and maintenance system, sustainability of the project is considered high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project has been highly relevant with the Chinese development plan and needs, as well as Japan’s ODA policies. Since the project cost and period were within the plan, its efficiency is considered high. Regarding its effectiveness, the project has largely achieved its development objective - improvement of the accessibility to markets and promotion of regional development - and it has contributed to the people’s living environment and poverty alleviation in the inland region. Thus, its effectiveness is considered high. Furthermore, since there were no major problems observed in the operation and maintenance system (organizational setup, technical capacity and financial status), sustainability of the project is also considered 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

The road side station (Michinoeki) installed at Jingtai prefecture is currently used as “a depot”. In order to fully utilize the facility, it is recommended to build a gas station, with a lavatory, and a shop adjacent to the Michinoeki. Excess agricultural products could be sold to gas station customers during the summer harvest season, as well as promote exchange with the local community.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

The effective indicator to assess the effectiveness of the project with road development being its main component is basically the passing traffic volume (comparison between the projected and actual traffic volume). However, since the site of this project is located in the remote inland region, its development objective is definitely to improve accessibility and expand the road network under the National Arterial Highway Network Development Plan, rather than to contribute to the development of the regional economy. Depending on the project, the targeted development objective needs to be fully considered, and the suitable indicators to assess the level of achievement made against the objective should be selected. Indicators to assess to what extent the network development has been achieved could be: 1) the number of the long-distance inter-urban bus operations; 2) the number of cargo vehicles traveling the long-distance; 3) the shipping volume of agricultural products to major cities; 4) the number of shops opened by the major nationwide supermarket chains; and 5) the number of days when the parallel existing road (national/provincial roads) was closed due to heavy rain or snow.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
① Project Output		
i) Expressway Liuzhaike-Baiyin Expressway	・ Length: 110km ・ Lanes: 4-lane both direction ・ Pavement: asphalt concrete ・ Bridges: about 40 units ・ Interchanges: 6 locations ・ Service areas: 2 locations ・ Toll stations: 7 locations ・ Electrical/Mechanical facilities (toll collection, communications, monitoring)	・ Length : as planned ・ Lanes: as planned ・ Pavement: as planned ・ Bridges: 34 units ・ Interchanges: as planned ・ Service areas: as planned ・ Toll stations: 6 locations ・ Electrical/Mechanical facilities: as planned
ii) Rural Road Jingtai-Xicao Highway	・ Length: 100km ・ Lanes: 2-lane both direction ・ Pavement: asphalt concrete ・ Bridges: about 14 units ・ Service areas: 2 locations	・ Length: 102km ・ Lanes: as planned ・ Pavement: as planned ・ Bridges: as planned ・ Service areas: 1 locations
iii) Consulting services	・ Supervision 50 M/M ・ Overseas training 20 M/M	・ Supervision: 36.6 M/M ・ Overseas training: as planned
② Project Period	March 2002 (L/A) ~ May 2006 (Project completion) (51 months)	March 2002 (L/A) ~ December 2005 (Opening of Expressway) (46 months)
③ Project Cost Foreign currency Local currency Total Yen Loan Portion Exchange rate	 20,013 million yen 25,614 million yen 1,708 million yuan 45,627 million yen 20,013 million yen 1 yuan = 15 yen (as of September 2001)	 18,419 million yen 20,507 million yen 1,342 million yuan 38,926 million yen 18,419 million yen 1 yuan =14.24 yen (Simple average between September 2003 and September 2008)

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan Project
Xian Xianyang International Airport Terminal Expansion Project

External Evaluator: Yasuhiro Kawabata, Sanshu Engineering Consultant

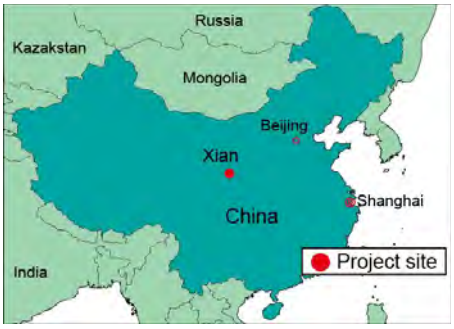
0. Summary

The project objective was to contribute to the enhancement of economic/commercial activities and trade in China's northwestern region through meeting the increasing traffic demand at the existing Xian Xianyang International Airport by constructing the new passenger terminal building and relevant facilities.

The project has been highly relevant with the Chinese and provincial development plans and needs, as well as Japan's ODA policies. Although the project cost was within the plan, the actual project period was much longer. Therefore, the efficiency is considered fair. Regarding its effectiveness, the project has largely achieved its development objectives (respond to the increasing passenger/cargo demand and contribution to the regional economy); therefore its effectiveness is considered high. Since there were no major problems observed in the operation and maintenance system, sustainability of the project is considered high.

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

1. Project Description



Project site

Xian Xianyang Airport No. 2 Terminal

1.1 Background

Since 1978, when the reform and open-door policies commenced, the transporting volume by air has substantially increased in China. The growth rate in terms of number of passengers by air was 18% per annum during the 10-year period from 1980 to 1990, and number of cargo by air was 15% per annum during the same period. The number of passengers has increased by 25% per annum and cargo by 22% per annum during the 5-year period from 1990 to 1995.

Despite the rapid increase in demand for passengers and air cargo, less progress has been made in the development of infrastructure, including airport facilities, such as the airport terminal and the control system, facilities around airports such as the water supply and sewage treatment system, roads/railways access to airport, and accommodation facilities around the airports in China. Construction and rehabilitation of airports, that would have enough capacity to handle the increasing demand, was considered a priority.

Xian is a provincial capital of Shaanxi province and it is the largest city in western China, with a total population of about 8.3 million (as of 2007). Before the reform and open-door policies commenced, the share of heavy industry in the industry sector was high and the local economy depended on special industry, such as the arms industry. However, the economic policy, encouraging the development of high-technology industry and conversion of industry, has been recently adopted. Since Xian Xianyang Airport was open to public in 1991, the volume of passengers and cargo by air has been increasing with the economic development. When the airport expansion plan was made, it was expected that the passengers by air would reach 2.24 million in 2000. However, the number of passengers reached 2.86 million in 1998, much higher than projected. Taking into account the current number of passengers, expansion of the airport facilities was a high priority in order to respond to the ever increasing traffic demand.

1.2 Project Outline

The project objective is to contribute to the enhancement of economic/commercial activities and trade in China's northwestern region through meeting the increasing traffic demand at the existing Xian Xianyang International Airport by constructing a new passenger terminal building and relevant facilities. The project plan is shown in Figure 1.

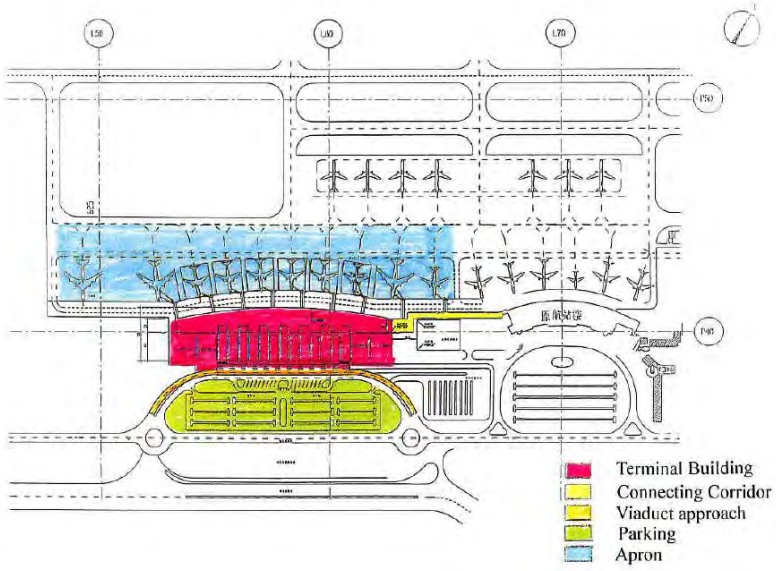


Figure 1 Project Plan

Approved Amount/Disbursed Amount	3,091 million yen / 3,091 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	October 2000 / October 2000
Terms and Conditions	Interest 0.95%; Repayment period 40 years with grace period of 10 years Tied under the Special Yen Loan[1]
Borrower/Executing Agency	People's Republic of China/General Administration of Civil Aviation of China (Xian Xianyang International Airport)
Final Disbursement Date	February 2009
Main Contractor (over 1 billion yen)	-
Main Consultant (over 100 million yen)	-
Feasibility Studies, etc.	Feasibility Study for Xian Xianyang International Expansion Project (China Civil Aviation Airport Construction Company/China Civil Aviation Airport Planning, Design and Research Institute, June 1999; EIA (China Environmental Science Research Institute, November 1999)
Relevant Projects	None

2. Outline of the Evaluation Study

2.1 External Evaluator

Yasuhiro Kawabata, Sanshu Engineering Consultant

2.2 Duration of Evaluation Study

The subject ex-post evaluation assignment was implemented as follows:

Duration of the Study : October 2010 to October 2011

Duration of the Field Study : January 9-21, 2010 and April 3-15, 2011

[1] This project was implemented utilizing the Special Yen Loan (SYL). SYL was introduced by the government of Japan in 1998 as one of the financial relief measures for Asian countries suffered from the Asian economic crisis. SYL was to provide concessionary financial assistance for the development of infrastructures in the fields of transportation logistics, foundation for productive facilities and large-scale disaster prevention. The terms and conditions of SYL is set at greater concessionary level than standard terms and conditions of ODA loans, while the eligibility of the prime contractors under SYL is limited to Japanese nationals or judicial persons and procurement of goods and services under SYL is tied to Japanese goods and services (goods and services whose country of origin being other than Japan can be procured up to no more than 50% of the total loan amount).

3. Results of the Evaluation (Overall Rating: A[2])

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan

Under the 9th Five-Year Plan for the China Civil Aviation Development (1996-2000), it was projected that by 2000 the total nation-wide air cargo would reach 11.6 billion ton-km, and that the annual transporting volume would reach 64 million passengers and 1.95 million tons of air cargo together with 1,122 air routes by regular airline flights. In order to respond to the transporting demand by air, the government decided to address the following: 1) increase the number of aircrafts from 416 units in 1995 to 660 units; 2) new construction or rehabilitation of 41 major airports, including those in government directly-controlled cities, autonomous/provincial capital cities, and other major cities; 3) development of air navigation control system; and 4) establishment of a training center to train professionals to be involved in the air business, including becoming pilots and air navigation controllers. The 10th Five-Year Plan has determined that the western region has the most priority, and that during the five-year plan, 20 airports would be constructed (including rehabilitation and expansion). It was expected that by 2005, the number of passengers and cargo volume would reach 94 million and 3.6 million tons, respectively.

Chapter 16 “Development of Producer’s Service Industry” of the 11th Five-Year Plan states that the large airport would be further expanded, airport density in the western central/northeastern regions would be enhanced, and more modern air navigation control systems would be established. Furthermore, Chapter 15 of “the Recommendations to the Establishment of 12th Five-Year Plan (2011-2015): National Economy and Social Development” by the National Central Party Committee has decided that the development of port and airport facilities would continue and that the reform of air navigational zone control system would be implemented.

Chapter 6 of “the Manual for the 11th Five-Year Plan: National Economy and Social Development” by the Shaanxi Provincial Party Committee emphasizes that regarding airport development, “one main and four sub” air navigational network - Xian Xianyang Airport as being the main and those in four rural cities as the sub-airports - would be established.

3.1.2 Relevance with the Development Needs

Since Xian Xianyang Airport was open to public in 1991, the number of passengers and cargo volume by air has been increasing and the actual number of passengers and cargo volume has exceeded the projected figures. Under the current and rapidly increasing demand, the Shaanxi

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[3] ③:High, ②:Fair, ①:Low

Provincial government has determined that expansion of the airport facilities was a high priority.

The current “Chapter 3 of the Recommendations to the Establishment of 12th Five-Year Plan” by the Shaanxi Provincial Party Committee emphasizes that the infrastructure development is still an important agenda. Particularly, with regards to the development of airports, it emphasizes the following: strengthening the hub function of Xian Xianyang International Airport; further development of the air navigational network; and promotion of the air service business.

3.1.3 Relevance with Japan’s ODA Policy

In the Annual Report on the Implementation of Japan’s ODA (1999), the aid policy towards China was to resolve the lagging infrastructure development, including transport, communications and power sectors, which was an obstacle in China’s economic development, thus making it one of the priority sectors. Particularly in the transport sector, it was proposed to provide aid to projects that would increase transporting capacity by constructing transportation facilities and enhancing the maintenance and management technology that would raise transportation efficiency.

According to the Overseas Economic Cooperation Implementation Policy (issued on December 1, 1999 and valid up to March 2002), the Japanese aid policy towards China focused on alleviation of disparity between regions, particularly giving priority to inland regions and to the development of the economic and social infrastructure that would promote self-motivating economic development to promote the development of the private sector and democratic markets, and to urge a well-balanced development to promote a market-oriented economy.

Accordingly, the project has been highly relevant with the Chinese development plan and needs, as well as Japan’s ODA policies. Its relevance is therefore considered high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The original and actual output is shown in Table 1.

Table 1　Output (Original and Actual)

Item	Original	Actual
1) Civil work	・ Passenger Terminal: about 52,000 m^2 ・ Apron: about 200,000 m^2 with 13 spots (boarding bridge) ・ Access Road: about 3km ・ Utilities (power, water supply and sewage, drainage, air conditioning and natural gas)	: about 79,000 m^2 (about 50% increase) : about 240,000 m^2 (about 20% increase), 20 spots (8 units are under the Yen Loan and 5 units by own funds) : about 6km (100% increase) : almost as planned
2) Procurement of equipment	・ Equipment and materials needed for the above civil work	: almost as planned

Source: Appraisal documents and responses to the Questionnaire

The main reason that the planned passenger terminal area has increased by 50% was because the structure of the terminal building was changed from a three-story building to a three-story building above ground and a basement with a parking lot, offices, maintenance facilities, service resting facilities and other facilities with more spaces based on the results of the review conducted on demand projection. A larger apron area (20% larger than planned) was constructed to respond to the future traffic demand. The access roads were expanded, double its original length, to allow it to be connected with the newly constructed expressway.

Under the original plan, eight boarding bridges were to be constructed together with the new construction of the terminal building, and five were to be constructed replacing the existing bridges after the rehabilitation of the old terminal. However, since it was considered that the supply and installation of five bridges would not be completed by the original loan closing date (January 31, 2006), it was decided that this would be locally funded.

Before this project was completed, construction of the second runway, with a length of 3.8 km, and a third passenger terminal, with an area of 50,000 m^2, of the Xian Xianyang International Airport had commenced and work is expected to be completed by mid 2012. Consequently, the handling capacity of the airport will be enhanced substantially.

Inside of Air Port Terminal

Boarding bridge

3.2.2 Project Inputs

3.2.2.1 Project Cost

The actual total project cost was 18.555 billion yen, of which the Japanese ODA loan amount was 3.091 billion yen and the rest was funded by the Shaanxi Province and Xian International Airport Company. It was equivalent to 113% of the planned project cost (16.436 billion yen) and 104% in Chinese yuan (1.326 billion). However, as discussed above in para. 3.2.1, Project Outputs, the planned passenger terminal floor area has increased by about 50%, the apron area by about 20%, and the total length of access roads by about 100%, and as a consequence, the project scope has been expanded as well. The estimated actual project cost of the original project scope was about 15 billion yen, which was within the plan.

The total project cost in Chinese yuan was almost within the planned cost although there were some design changes and variations, including those for the passenger terminal, apron and access roads. One of reasons is attributed to lower bidding price offered by bidders made possible by introducing competitive bidding procedures, including the International Competitive Bidding (ICB). However, the project cost was increased by about 13% in Japanese yen due to depreciation of Chinese yuan (devalued by about 8%) and other reasons.

Table 2 Comparison of Project Cost (Planned and Actual)

Item	Planned					Actual				
	Foreign currency	Local currency		Total		Foreign currency	Local currency		Total	
	Million yen	Million yuan	Million yen	Million yuan	Million yen	Million yen	Million yuan	Million yen	Million yuan	Million yen
Land acquisition		45.95	570	45.95	570		42.93	577	42.93	577
Passenger Terminal	2,829	336.45	4,172	564.60	7,001	3,091	457.52	6,145	687.68	9,236
Apron	82	81.97	1,017	88.63	1,099		76.19	1,023	76.19	1,023
Access road		19.83	246	19.83	246		74.64	1,002	74.64	1,002
Other utilities		332.67	4,125	332.67	4,125		421.36	5,659	421.36	5,659
Other facilities		126.48	1,568	126.48	1,568					
Tax/ Administration		73.63	913	73.63	913		78.78	1,058	78.78	1,058
Price escalation	33	18.38	228	21.05	261					
Contingency	147	40.84	506	52.66	653					
Total	3,091	1,076.20	13,345	1,325.50	16,436	3,091	1,151.42	15,464	1,381.58	18,555

Source: Appraisal documents and responses to the Questionnaire

Exchange rates: 1 yuan=12.4 yen at appraisal and 1 yuan=13.43 yen at post evaluation (average of exchange rates during the implementation period 2000-2003

Although the actual project cost was much higher than the plan, it was still considered appropriate because of the changes in the project scope.

As explained above, this project was implemented utilizing the Special Yen Loan (SYL) and the customer satisfaction survey was conducted during the ex-post evaluation. According to the

executing agency, the bid price was not higher than a bid price seen in other similar type of projects in China and the quality of the contractors was at a satisfactory level.

3.2.2.2 Project Period

The project period planned at appraisal was from October 2000 (signing of the Loan Agreement) to June 2002 (project completion), with a total period of 21 months. However, the Executing Agency prepared the implementation plan in which part of the work scheduled for July 1999. The project period according to this implementation schedule was 36 months from the commencement of bidding (July 1999) through the proposed project completion date (June 2002).

The actual project period was from October 2000 (signing of the Loan Agreement) to September 2003 (opening of a passenger terminal) with a total period of 36 months, or equivalent to 171% of the planned period. The reasons for the 17-month delay in passenger terminal opening to the public from the originally planned completion date (June 2002) were: 1) design changes, including installation of parking and office spaces in the terminal basement; and 2) outbreak of severe acute respiratory syndrome (SARS) during end 2002 - early 2003, prohibiting the movement of people and cargo.

Part of the Yen loan was used for replacement/upgrading of equipment in the old terminal building (materials for water supply and sewage systems, air conditioners, electrical circuit, escalators, elevators and electric sign board). As a result, the loan closing date became February 2009.

Security Check Facilities

Check-in Baggage Sorting Table

The bidding procedure proposed at appraisal was International Competitive Bidding (ICB – Japanese tied) for the foreign currency funded portion, with 11 packages for structures, interior, lighting, power supply, transporting equipment, security check, boarding bridges, elevators/escalators, intelligent system, terminal lighting system, and air conditioning system. The local currency funded portion included mostly civil and installation work, to be procured

through National Competitive Bidding (NCB).

The actual bidding procedure used for the foreign currency funded portion was ICB (Japanese tied) as planned. The actual number of procurement packages was 15. The items procured were almost the same as those planned at appraisal. The local currency funded portion included mostly civil and installation work, and these work was procured through National Competitive Bidding (NCB). The number of procurement packages was about 50.

The majority of the goods (equipment and materials) were procured through 15 ICB packages. However, since the procurement method/packages included: 1) procurement of goods; 2) supply and installation procurement method; and 3) procurement of goods and work through NCB procedures, the procurement implementation operation became so complex, and the details of daily coordination among suppliers and contractors regarding the timing of delivery of equipment and material, and the civil work implementation plan was required. The project management became extremely difficult.

The actual project period largely exceeded the plan because of impacts of "SARS" and other reasons.

According to the customer satisfaction survey, the executing agency stated that there were some cases that needed a longer procurement period because of rebidding due to less qualified bidders, but that they were satisfied with the contractors' effort to keep the contract term so that the work was completed on time for the planned date for opening of the air terminal.

Although the project cost was within the plan, the project period was much longer than planned; therefore the efficiency is considered fair.

3.3 Effectiveness[4] (Rating: ③)

3.3.1 Quantitative Impacts

3.3.1.1 Results from Operation and Effect Indicators

(1) Number of Passengers at Xian Xianyang Airport

The number of passengers using the Xian Xianyang Airport is shown in Table 3.

[4] The rating of the project's effectiveness takes into account the evaluation of the project's impact.

Table 3　Number of Passengers at Xian Xianyang Airport

Unit: 0,000 persons

	1998 Base year	2003	2005 2 years after completion	2006	2007	2008	2009	2010
Projected		408	466	523	580	637	694	750
Actual	286	440	794	937	1,137	1,192	1,529	1,801
Domestic	268	424	752	890	1,085	1,164	1,503	1,766
International	18	16	42	47	52	28	26	35

Source: Appraisal documents and responses to the Questionnaire

Note 1: Domestic includes direct flights between Xian, and Hong Kong and Taiwan.

Note 2: International includes direct flights between Xian, and Tokyo, Nagoya, Bangkok, Kuala Lumpur, Singapore, and Seoul.

Note 3: The new terminal was open to public on September 18, 2003.

At the planning stage, the number of passengers at Xian Xianyang Airport was projected to increase by 1.7 times during the period of 2003-2009. However, it increased by 3.48 times, which was much higher than the average growth rate (2.6 times) of China. It was obvious how rapidly the number of passengers at Xian Xianyang Airport has increased. The actual number of passengers is about 2.4 times higher compared to the projected for 2010 at the planning stage.

The total area of the passenger terminal added the newly constructed terminal area (79,000 m^2) to the old terminal area is about 100,000 m^2. Compared with the Fukuoka Airport, which has a terminal with the area of 178,000 m^2, and a 2,800 m runway with 140,000 takeoffs and landings a year (in 2009), the total terminal area is considered to be insufficient. Since the actual number of passengers (about 6.2 million) using the Xian Xianyang Airport has substantially exceeded the projected number of passengers in 2004, the Xian Xianyang Airport Company prepared an airport rehabilitation plan, which included construction of an additional terminal building and a second runway. The Airport Company commenced the rehabilitation work, including construction of the third terminal building and the second runway in December 2008; and work is expected to be completed by end 2012.

(2) Cargo Handling Volume at Xian Xianyang Air Port

The cargo handling volume at Xian Xianyang Air Port is shown in Table 4.

Table 4　Cargo Handling Volume at Xian Xianyang Air Port

unit: 0,000 tons

	1998 Base Year	2003	2005 2 years after completion	2006	2007	2008	2009	2010
Projected		8.1	9.2	10.0	10.7	11.5	12.2	13.0
Actual	5.8	6.3	8.3	9.9	11.2	11.7	12.7	15.8
Domestic	5.3	5.8	7.8	9.1	10.3	11.1	12.3	15.4
International	0.5	0.5	0.5	0.8	0.9	0.6	0.4	0.4

Source: Appraisal documents and response to the Questionnaire
Note: Domestic includes those of direct flights between Xian and Hong Kong and Taiwan.

The cargo handling volume (aerial post) at Xian Xianyang Air Port has been increasing since 2006 almost as projected. However, the actual handling volume in 2010 was about 20% greater than projected.

(3) Number of Takeoffs and Landings

The number of takeoffs and landings at Xian Xianyang Air Port is shown in Table 5.

Table 5　Number of Takeoffs and Landings at Xian Xianyang Air Port

unit: 0,000 times

	1998 Base Year	2003	2005 2 years after completion	2006	2007	2008	2009	2010
Projected		8.1	9.2	10.0	10.7	11.5	12.2	13.0
Actual	3.6	5.7	8.2	9.8	11.5	11.5	14.4	16.1
Domestic	3.4	5.5	7.8	9.3	11.1	11.3	14.2	15.8
International	0.2	0.2	0.4	0.4	0.4	0.2	0.2	0.3

Source: Appraisal documents and response to the Questionnaire
Note: Domestic includes those of direct flights between Xian and Hong Kong and Taiwan.

The number of takeoffs and landings at Xian Xianyang Airport has been increasing since 2009, exceeding the projected number. The actual number of takeoffs and landings in 2010 was 161,000 (the number of takeoffs and landings at Fukuoka Airport in Japan, which seems to reach its handling capacity was 130,000 a year).

Upon completion of the project, the new terminal, as well as the old terminal, can handle the increasing demand of passengers and cargo; therefore its effectiveness has appeared.

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

Financial Internal Rate of Return (FIRR)

FIRR at appraisal and at post evaluation are shown on Table 6

Table 6 FIRR (at appraisal and at post evaluation)

	At appraisal	At post evaluation
FIRR	11.0	13.7

Note: Benefits includes Takeoff/Landing fee, Ground service fee, Terminal fee and others Costs include Construction costs, Operation and Maintenance and Taxes.
Project life: 20 years

The FIRR at appraisal was copied from the appraisal document. It is difficult to calculate the FIRR at post evaluation based on the same assumptions made at appraisal because of several design changes (i.e., construction of the second runway at project completion, commencement of the third passenger terminal, and reconstruction/conversion of the ground parking lots to a parking garage/building). The FIRR stated in the feasibility study report (2008) showed references to the construction plan for the second runway and the third terminal.

Terminal Departure Entrance

Check-in Counter

3.3.2 Qualitative Effects

Xian Xianyang International Airport has been responding to the air traffic demand (passenger and cargo), to and from Xian, and serving as a hub airport in China's northwestern region. Regarding domestic flights, all four major airlines call at Xian to connect with major cities, including Beijing, Shanghai, Guangzhou, Chongqing and about 40 local cites (including Ankang, Yanan and Yulin in Shaanxi Province). Compared with the number of flights call at Chongqing, which has about the same urban population (about 4 million), the number of flights call at Xian is higher. With respect to international flights, four foreign airlines, including Japan Air Lines, call at Xian and connect with Tokyo, Pusan, Seoul, and Bangkok. Four other domestic airlines connect with Hong Kong, Taipei and Osaka.

Before the project was completed, check-in counters were prepared for each departing flight. Under the project, advanced computerization of the operational system had made it possible to check in at any counter. Thus, the time for check-in procedures has been substantially reduced,

and efficiently operated.

The Xian Xianyang Airport ranks 8th overall in the number of passengers among the airports in China.

Accordingly, the project has largely achieved its development objective, and its effectiveness is considered high.

3.4 Impact

3.4.1 Intended Impacts

At the appraisal stage, it was expected that upon completion of the project, the airport operation company, which would be responsible for operation and maintenance of the airport would employ about 180 staff and entrust the daily operation and maintenance work to the subsidiary or relevant companies (about 1,200 employees). The current total number of employees of the airport operation company is about 1,600. The subsidiary company responsible for cleaning works has about 700 employees, and the management of parking lots has about 200 employees. Thus, the project contributes to the regional economic development through increasing the employment opportunities.

In addition, the Shaanxi's development plan for Xianyang Airport Industrial Park intends to invite industries, including airport related businesses, such as air cargo handling, repair and maintenance of large aircrafts, and air in-flight services/ transport neighboring the airport. This park is expected to be completed by 2020.

The average GDP growth rate during 2004-2009, upon completion of the airport terminal, was about 14%, which indicated high economic growth. The total income from the tourism in Shaanxi accounts for about 9% of Shaanxi's GDP, which indicates that tourism, is one of its important sources of revenue.

3.4.2 Other Impacts

(1) Impacts on the Natural Environment

The noise level around the airport has been regularly monitored. Since the houses that were feared to be affected by the noise during the construction stage, were acquired and resettled, hence there were no noise problems reported. Since the sewage treatment plant with a capacity of 10,000 tons/day was constructed under the project, no problem on discharged water and sewage has been also reported. Xian Xianyang International Airport received the National Greenization Model Project Honor Award in March 2004 and the airport company was recognized as the Provincial Green Enterprise in June 2004.

(2) Land Acquisition and Resettlement

The original plans for land acquisition area and number of resettled people were 45 ha and about 650, respectively. However, the actual land area acquired was 47.6 ha. The reasons for increased land area were: 1) the houses, feared to be affected by the noise, were additionally acquired and resettled; 2) remaining agricultural land, use of the land was considered ineffective, was acquired at the request of the land owners; and 3) designs for roads and drainage facilities were changed, taking into consideration the possibility of future airport expansion. The actual number of resettled people was about 650 as planned, but the actual costs spent for the land acquisition and resettlement was 42.93 million yuan, which is less than the originally planned (the estimated cost at the feasibility stage). According to the executing agency, since the notice to and consultation with the residents were fully undertaken before the project implementation, no complaint has been reported after the project completion.

(3) Unintended Positive and Negative Impacts

No negative impact has been observed.

The project has increased the employment opportunities within or outside the airport and thus, it has contributed to the regional economic development. The project has led the growth of the regional economy and industry through the Xianyang Airport Industrial Park Plan.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

After the passenger terminal was completed in 2003, the organizational set up to operate the airport has changed a few times. On August 1, 2008, four group companies merged and the present China West Airport Group (CWAG), which has main assets such as the airport terminal and the energy supply facilities, was established. Currently, Xian Xianynag International Airport Company (XXIAC), which is a subsidiary company of CWAG, is in charge of operation and maintenance of the airport. Under the Board of Directors and Board of Audits, XXIAG consists of a General Manager, 7 Deputy General Managers, and 15 departments and offices with a total number of about 1,600 employees. All the staff assigned to the Equipment and Electric Facilities Maintenance/Management Department (about 90 staff) and some of the staff assigned to Terminal Operations Department (about 30 staff) is responsible for maintenance work for the airport. Staff of Security Inspection Department (660 staff) is responsible for the security check operations, and the clearing work in the terminal building and the management of parking lots are entrusted to subsidiary companies.

3.5.2 Technical Aspects of Operation and Maintenance

There is about 122 staff, who is in charge of maintenance work. By category of the educational background, 42 are Master's or Bachelors' degree holders, 63 Associate degree (vocational school) holders, and 17 non-degree holders. There is 25 staff, who has technical qualifications (one professional engineer, 12 middle-class engineers, and 12 junior engineers). The Airport Company has undertaken the training program every year taking into account the technical skills required to each post and needs required for the career development for each staff. At the end of year, results of the training achievement and the implementation status of the training program have been assessed. The 2010 training program provided to the staff in charge of maintenance work, including the staff of the Equipment and Electric Facilities Maintenance/Management Department consisted of 15 modules and the training was provided outside the company. The timing of the training, number of trainees, training duration, and the targeted objective were clearly defined in the training program.

With respect to the airport operation and maintenance work, the laws/ regulations/code on fixed asset investment management, facilities/equipment/vehicle management, construction supervision, tentative business operation/management and others have been stipulated and these have been implemented.

3.5.3 Financial Aspects of Operation and Maintenance

The financial status of the Xian Xianyang International Airport Company (XXIAC), which is in charge of operation and maintenance of the airport for the past three years, is shown in Table 7.

Table 7 Financial Status of Xian Xianyang International Air Port Company

unit: 000 yuan

	Item	2008	2009	2010
1	Main Business income	407,082	555,680	646,053
2	Operation costs	285,492	324,614	344,717
3	Maintenance costs	62,298	81,153	86,179
4	Taxes	14,067	19,603	26,280
5	Profits from main business	45,225	130,310	188,877
6	Profits from other business	52	0	0
7	Financing costs	47,454	-22,920	3,160
8	Business profit	-2,176	153,230	185,717
9	Non-business income	0	0	210
10	Non-business expenditures	5,000	0	16,290
11	Net profit	-7,176	153,230	169,636

Source: Executing agency

Since the financial costs due to borrowing accrued in 2008, there was a shortfall in net profit. However, since the number of passengers has increased for the past two years (2009 and 2010), the company has had a surplus. The gross capital of the company has increased every year, and

thus the company's financial status has been stable.

3.5.4 Current Status of Operation and Maintenance

The daily routine maintenance work has been undertaken by XXIAG. When the more technically difficult repair/maintenance cannot be handled by the company, the work is entrusted to the special maintenance company and has been regularly undertaken. Major repair and rehabilitation work has been entrusted to the contractor, which was selected through the competitive bidding.

The airport currently has two terminal buildings, 15 boarding bridges, 21 security check booths, 71 check-in counters, and 13 cargo sorting turntables. From the field inspection it seems that the facilities and equipment are in a good condition. Boarding bridges and cargo sorting tables have already been overhauled.

Therefore, since no major problems have been observed in the operation and maintenance system (organizational setup, technical capacity and financial status), sustainability of the project is considered high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project objective was to contribute to the enhancement of economic/commercial activities and trade in China's northwestern region through meeting the increasing traffic demand at the existing Xian Xianyang International Airport by constructing the new passenger terminal building and relevant facilities.

The project has been highly relevant with the Chinese and provincial development plans and needs, as well as Japan's ODA policies, and therefore its relevance is high. Although the project cost was within the plan, the project period was much longer. Therefore, the efficiency is considered fair. Regarding its effectiveness, the project has largely achieved its development objectives (respond to the increasing passenger/cargo demand and contribution to the regional economy), and thus, its effectiveness is considered high. Since no major problems have been observed in the operation and maintenance system, sustainability of the project is considered high.

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

4.2 Recommendations

4.2.1 Recommendation to the Executing Agency

none.

4.2.2 Recommendation to JICA

none.

4.3 Lessons Learned

Regarding the procurement of goods, majority of goods (equipment and materials) were procured through the ICB procedures. However, the procurement method/packages included: 1) procurement of goods only; 2) supply and installation procurement method; and 3) procurement of goods and work through NCB procedures. Thus, the procurement implementation operation became so complex, and the details of daily coordination among suppliers and contractors regarding the timing of delivery of equipment and material, and the civil work implementation plan were needed.

Since the project requires procurement of a number of goods, an implementation plan for civil works and a detailed procurement implementation plan (planning of detailed procurement process and procedures for work and goods, appropriateness of procurement packages, review of technical specifications and others) should be prepared in order to have a well-organized comprehensive project implementation plan.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
① Project Output	**Civil Work** ・ Passenger Terminal: about 52,000 m^2 ・ Apron: about 200,000 m^2 with 13 spots (boarding bridge) ・ Access Road: about 3km ・ Utilities (power, water supply and sewage, drainage, air conditioning and natural gas) **Procurement of Equipment** ・ Equipment and materials needed for the above civil work	 : about 79,000 m^2 (about 50% increase) : about 240,000 m^2 (about 20% increase), 20 spots (8 units are under the Yen Loan and 5 units by own funds) : about 6km (100% increase) : almost as planned : almost as planned
② Project Period	October 2000 (L/A)~ June 2002 (Project completion) (21 months)	October 2000 (L/A)~ September 2003 (Opening of terminal) (36 months)
③ Project cost Foreign currency Local currency Total Yen Loan Portion Exchange rate	 3,091 million yen 13,345 million yen (1,076 million yen) 16,436 million yen 3,091 million yen 1 yuan＝12.4 yen (as of January 2000)	 3,091 million yen 15,464 million yen (1,151 million yen) 18,555 million yen 3,091 million yen 1 yuan ＝13.43 yen (Average of September 2000~ September 2003)

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan Project
Beijing Urban Railway Construction Project

External Evaluator: Masami Tomita, International Development Associates Ltd.

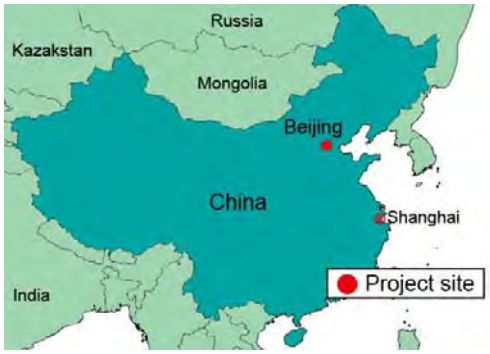
0. Summary

This project aimed at improving transportation networks and reducing traffic congestion along the railroad by constructing railways between Xizhimen and Dongzhimen in the Beijing City, thereby contributing to reduction of aerial pollution and regional development.

Relevance of this project is high, as the project is consistent with priority areas of China's development plans and Japan's ODA policy, and moreover development needs for the project are high. Efficiency of the project is fair, as both project cost and period exceeded the plan while outputs of this project are almost as planned. Effectiveness of the project is high, as the project more or less achieved targets in major operation and effect indicators and beneficiaries showed high level of satisfaction with this project. The overall goal of the project, which is to contribute to regional development, has also been mostly achieved. Sustainability of the project is high, as no major problems have been observed in the operation and maintenance (O&M) system, technical capacity and financial status of the O&M organization.

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

1. Project Description



Project Location

Platform of the Lishuiqiao Station

1.1 Background

While reform and door-opening policies of China started in 1979 have brought remarkable economic development and improvement in living standards of its nationals, they also promoted motorization in major cities such as Beijing and Shanghai, which exacerbated traffic congestion. In the Beijing City, the speed of construction of road networks could not meet the increasing

demand for public transportation and construction of subways that enable mass transit was delayed, and consequently, chronic traffic congestion resulted from the increased number of passenger cars. In this situation, the Chinese Government determined to introduce urban transport systems such as subways in cities where population is over 1 million and GDP exceeds 50 billion RMB, aiming at tackling inadequate urban infrastructure and further economic development.

The northern part of the Beijing City, which is located along the urban railway constructed by the project (Line 13), contains residential development areas such as Qinghe Development Zone, Beiyuan Development Zone, and Wangjing Development Zone, etc, which were priority areas to reduce population of the city centre by moving population to suburbs. However, existing means of access from these development areas to the city centre were limited to buses and taxies only, and hence this project possessed high importance in order to cope with population growth in these development areas and materialize migration of population from the city centre to suburbs.

This project was implemented based on an urban development plan that aimed at tackling serious traffic congestion in the Beijing City centre, developing the northern part of the city, and constructing an urban transport system that penetrates to the northern area.

1.2 Project Outline

The objective of this project is to improve transportation networks and reduce traffic congestion along the railroad by constructing railways of approximately 40 km between Xizhimen and Dongzhimen in the Beijing City, thereby contributing to reduction of aerial pollution and regional development. Figure 1 shows the subway map of the Beijing City including the line constructed by the project.

Source: Shanghai Explorer
Note: as of December 30, 2010

Figure 1: Beijing Subway Map

Loan Approved Amount/ Disbursed Amount	14,111million yen / 8,108million yen
Exchange of Notes Date/ Loan Agreement Signing Date	October, 2000 / October, 2000
Terms and Conditions	Interest Rate: 0.95% Repayment Period: 40years (Grace Period: 10years) Conditions for Procurement: Bilateral Tied[1]

[1] This project was implemented utilizing the Special Yen Loan (SYL). SYL was introduced by the Government of Japan in 1998 as one of the financial relief measures for Asian countries suffered from the Asian economic crisis. SYL was to provide concessionary financial assistance for the development of infrastructures in the fields of transportation logistics, foundation for productive facilities and large-scale disaster prevention. The terms and conditions of SYL is set at greater concessionary level than standard terms and conditions of ODA loans, while the eligibility of the prime contractors under SYL is limited to Japanese nationals or judicial persons and procurement

Borrower / Executing Agency	The Government of the People's Republic of China / Beijing Infrastructure Investment Co., Ltd.
Final Disbursement Date	January, 2008
Main Contractor (Over 1 billion yen)	Mitsubishi Corporation (Japan) / Sumitomo Corporation (Japan) / Nissho Iwai Corporation (Japan)
Main Consultant (Over 100 million yen)	None
Feasibility Studies, etc.	The Feasibility Study on the Project of the Beijing Urban Transit Railway Line from Xizhimen to Dongzhimen (Beijing Mass Transit Railway Corporation / Beijing Urban Engineering & Design Institute: July, 1999)
Related Projects	Beijing Subway Construction Project (1)(2) (1988-1992) Beijing Subway Construction Project Phase II (1)(2)(3)(4) (1992-2000)

2. Outline of the Evaluation Study

2.1 External Evaluator

Masami Tomita, International Development Associates Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: October, 2010 – October, 2011

Duration of the Field Study: January 15, 2011 –January 22, 2011, May 8, 2011–May 14, 2011

2.3 Constraints during the Evaluation Study

Beijing Mass Transit Railway Corporation, which originally was the executing agency of the project, was reorganized into the following three companies in 2003; Beijing Infrastructure Investment Co., Ltd. (responsible for finance, investment, and asset management of Light Rail Transit (LRT)), Beijing Mass Transit Railway Operation Co., Ltd. (responsible for O&M of LRT), and Beijing Transit Railway Transportation Construction and Management Co., Ltd. (responsible for construction of LRT). Data and information related to project appraisal and procurement provided from the executing agency was limited, due to the above restructuring and the fact that it has been eight years since the completion of Japan's ODA loan portion of the project (the start of trial operation in some sections). Therefore, evaluation was conducted by supplementing data and information unavailable from the executing agency with those collected from statistical books of the Beijing City, documents provided by JICA, and a beneficiary survey.

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of goods and services under SYL is tied to Japanese goods and services (goods and services whose country of origin being other than Japan can be procured up to no more than 50% of the total loan amount).

3. Results of the Evaluation (Overall Rating: A[2])

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan of China

The Ninth Five-Year Plan of the Beijing City (1996-2000) Chapter 4 emphasized construction of urban transportation systems and reduction of traffic congestion, and prioritized construction of rail transit systems such as subways as well as that of roads and airports. Moreover, the Master Plan of the Beijing City (1991-2010) Chapter 11 targeted at increasing the volume of public passenger transportation out of overall passenger transportation to 47.4% in 2000 and to 58.4% in 2010, by promoting construction of urban road networks and rail transit networks, aiming at significant improvement of urban traffic conditions. Lengths of rail transit systems in operation were expected to reach 70km in 2000 and 120km in 2010, and the Master Plan aimed at constructing 12 rail transit lines with lengths of approximately 300km covering the whole Beijing City and satellite cities such as Tongzhou Town, Yizhuang, and Huangcun in a long term.

At the time of ex-post evaluation, the Eleventh Five-Year Plan of the Beijing City (2006-2010) Chapter 3 aims at starting operation of subway Line 4, 5, 10 and the Olympic Line and operating more than 270km in total of rail transit systems in the Beijing City by 2010, in an effort to establish an integrated transport system and reduce traffic congestion. Moreover, the Master Plan of the Beijing City (2004-2020) Chapter 13 aims at construction of an integrated passenger transport system by 2020 centring on rail transit systems, making a public transportation a core transport system. It plans to construct 19 rail lines (15 urban lines and 4 suburban lines) with lengths of approximately 570km in total by 2020, connecting the Beijing City centre with new cities such as Tongzhou, Shunyi, Yizhuang, Daxing, Fangshan, and Changping.

Therefore, development plans of the Beijing City emphasize construction of urban transport systems and rail transit systems including subways both at the time of appraisal and ex-post evaluation.

3.1.2 Relevance with the Development Needs of China

At the time of appraisal, the Beijing City suffered from chronic traffic congestion caused by the increased number of passenger cars including taxies and influx of vehicles from suburbs, partly due to the fact that construction of subways that enable mass transit was delayed. The Line 13 constructed by the project possessed a high importance in order to move population from the city centre to suburbs (residential development areas along the Line 13) and to reduce

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[3] ③High, ②Fair, ①Low

population in the city centre.

At the time of ex-post evaluation, traffic congestion in the city centre has not been solved yet, as the number of passenger cars has been increasing due to increased income and living standards of citizens. However, residential development along the Line 13 has been progressed due to the fact that the Line 13 was opened to operation and it was connected with other lines such as Line 2, 5 and 10. Table 1 shows the transition of the volume of passenger transportation by major modes of transportation in the Beijing City. The number of subway users has been rapidly increasing partly due to the fact that the O&M organization introduced a single fare system (2RMB for all sections) at the end of 2007 in order to increase subway users, and thus needs for construction of subways are high.

Table 1: The Volume of Passenger Transport by Major Modes of Transportation in the Beijing City

(Unit: 10 thousand people / year)

	1998 (Before Project)	2006 (4years after Completion)	2007 (5years after Completion)	2008 (6years after Completion)	2009 (7years after Completion)
Bus	372,494	397,919	422,645	470,863	516,517
Taxi	63,817	64,121	64,111	69,000	68,000
Subway	46,331	70,306	65,493	121,660	142,268

Source: 1998 Data: Appraisal documents, Other data: Beijing Statistical Yearbook (2005, 2007, 2009, 2010)

3.1.3 Relevance with Japan's ODA Policy

The Country Assistance Program for China in Japan's Official Development Assistance Annual Report 1999 emphasized provision of assistance for resolving a delay in construction of economic infrastructures of transportation, communication, and electricity which has been a bottleneck for economic development in China. Of which regarding the transport sector, it planned to provide assistance that contributes to increased transportation capacity through construction of transport/traffic facilities and improvement of maintenance and management capability for transportation efficiency. Moreover, assistance for China's railway sector was prioritized in JICA's Policy for Overseas Economic Cooperation Operations.

This project has been highly relevant with China's development plans, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Table 2 shows outputs of the project (planned and actual). Outputs of the project were almost as planned. The reason for differences in quantity of power-supply equipments between the

original and actual scopes is unclear, as the executing agency did not have information.

Table 2: Project Outputs (Planned/Actual)

Item	Planned	Actual
Sections	From Xizhimen to Dongzhimen	As planned
Route Length	40.5km (of which underground 1.8km, at-grade 32.2km, elevated 6.5km)	As planned
No. of Stations	16 (of which underground 1, at-grade 14, elevated 1)	As planned
No. of Depot	1	As planned
Rolling Stocks	56 units	As planned
Attached Facilities	Train carried motors, train gear drive devices, train carried braking devices 56 sets	As planned
	Processing and maintenance equipments 4 sets	As planned
	Train carried air conditioners 448 sets	As planned
	Signal system 1 set	As planned
	Radio system 1 set	As planned
	Transmission system 1 set	As planned
	Automatic fare collection system 1set	As planned
	SCADAR system 1 set	As planned
	Heavy duty circuit breaker 370 sets	325 sets
	DC speed circuit breaker 100 sets	168 sets
	Comprehensive protecting devices for computers in propulsion power system 150 sets	117 sets
	Automatic fire alarm and extinguishing system 1 set	As planned

Source: F/S, appraisal documents, documents provided by JICA, interviews with relevant agencies

Rail Tracks near the Huoying Station

Automatic Ticket Gate at the Xizhimen Station

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned project cost at the time of appraisal was 72,725 million yen (foreign currency: 14,111 million yen, local currency: 58,614 million yen), of which Japan's ODA loan portion was 14,111 million yen. On the other hand, the actual project cost was 89,299 million yen (foreign currency: 8,108 million yen, local currency: 81,191 million yen), of which Japan's ODA loan portion was 8,108 million yen, and it was slightly higher than planned (123% against the plan).

According to the executing agency, the reason for the higher project cost in total was due to changes in exchange rates etc. Reasons for the lower Japan's ODA loan portion were that SCADAR system and automatic fire alarm and extinguishing system were procured with local budget instead of ODA loan and that procurement cost turned out to be lower as a result of competitive bidding.

As explained above, this project was implemented utilizing the Special Yen Loan (SYL) and the customer satisfaction survey was conducted during the ex-post evaluation. According to the executing agency, the bid price was not higher than a bid price seen in other similar type of projects in China and the quality of the contractors was at a satisfactory level.

3.2.2.2 Project Period

The planned project period at the time of appraisal was 34 months in total from October 1999[4] to July 2002 (the completion of the project was defined as open to traffic). On the other hand, the actual project period was 36 months in total from October 1999 to September 2002 (the start of trial operation from Xizhimen to Huoying), and it was slightly longer than planned (106% against the plan)[5]. The Line 13 was fully opened in January 2003 and procurement of all rolling stocks was completed in December 2004. However, assembling and acceptance inspection were completed after 2007 due to the fact that some defects were found in wheels, and that rolling stocks were sent back to the ordering party without inspection as Japanese technical staff had to leave because of the spread of SARS in 2003. Consequently, the loan disbursement period was extended till 2008.

Both project cost and project period slightly exceeded the plan, therefore efficiency of the project is fair.

3.3 Effectiveness[6] (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

(1) Volume of Passenger Transportation

Table 3 shows estimated and actual volume of passenger transportation of the Line 13.

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[4] Generally the start of a project is the timing of signing Loan Agreement (L/A), but procurement procedure (local currency portion) such as preparation of bidding documents was started before signing of L/A in this project, and thus in the evaluation of this project the starting point is defined as the start of the procurement procedure.

[5] The planned and actual periods from the start of the project to the trial operation are compared in order to evaluate the efficiency of the project, as the completion of the project was defined in L/A as open to traffic as the timing when effects of the project start to be realized.

[6] The rating of the project's effectiveness takes into account the evaluation of the project's impact.

Only average daily volume of passenger transportation is available for 2 years after the completion of the project (2004) and the actual volume is about 70% of the estimate. Actual volume reaches almost 80% of the estimate (estimated volume: 185,600 persons/day, actual volume: 153,700 persons/day) in 3 years after the completion of the project (2005). Both actual volume of average daily transportation and that of peak hour exceed estimated volume after 6 years of operation (2008). The number of passengers has steadily been increasing, as many lines that connect with the Line 13 were open to traffic.

Table 3: Volume of Passenger Transportation of Line 13

(Unit: average daily: 10 thousand persons/day, peak hour: persons)

	2 years after completion	4 years after completion	6 years after completion	7 years after completion	8 years after completion
Estimated Volume					
Average Daily	17.26	25.40	33.10	37.78	43.13
Peak Hour[7]	N/A	18,700	24,000	27,100	30,700
Actual Volume					
Average Daily	11.68	19.72	41.12	44.75	49.79
Peak Hour	N/A	16,700	28,200	32,000	35,000

Source: Estimated volume: appraisal documents, actual volume: answer to questionnaire

The Government of the Beijing City has deployed various efforts to reduce traffic congestion in the Beijing City and increase the number of subway users as follows; 1) a single fare system (2RMB for all sections since the end of 2007), 2) free transit to other lines, 3) provision of a bicycle-parking area at stations, 4) restriction on car use (since the Beijing Olympic Game in 2008 the Government has restricted driving cars according to the number on the far right of a car registration plate, for example, people who have a car with 3 or 8 on the far right of a car registration plate cannot drive their cars on Mondays, people who have a car with 4 or 9 on the far right of a car registration plate cannot drive their cars on Tuesdays, etc), and 5) restriction on purchasing cars (since November 2010 the Government has allowed purchasing of 20 thousand cars only per month in the entire Beijing City by making registration of a car plate assigned by lottery).

(2) Number of Running Trains

Table 4 shows the actual number of running trains on the Line 13. The number of running trains per day in 2010 more than doubled since 2005.

[7] Maximum cross-sectional passenger flow per peak hour

Table 4: The Number of Running Trains on Line 13

(Unit: number/day, number/peak hour)

Period	Day	Peak Hour(7:00-9:00) (per hour)
January 2005 – October 2005	234	10
October 2005 – September 2006	287	12
September 2006 – October 2007	334	15
October 2007 – December 2007	461	17
December 2007 – December 2009	481	20
2010 –	499	N/A

Source: answer to questionnaire

(3) Operation Interval

Table 5 shows actual operation interval of the Line 13. Planned operation interval at the time of appraisal was 2 minutes per peak hour, and actual operation interval in 2010 is 3 minutes per peak hour, which is close to the planned figure.

Table 5: Operation Interval of Line 13

(Unit: minute)

Year	Peak Hour	Off-Peak Hour
2003	8	14
2004	6	13
2005	6	13
2006	5	11.5
2007	3.5	9
2008	3	7-8
2009	3	6-8
2010	3	5-8

Source: answer to questionnaire

(4) Rush Ratio[8]

Table 6 shows the actual rush ratio of the Line 13. The ratio is over 100% since 2006. As explained below, in the beneficiary survey about 40% of respondents answered "uncomfortable" regarding the question for the congestion situation of the Line 13. While it would be difficult to solve this issue instantly as the current operation interval is very close to the target, which is 3 minutes per peak hour, there is a room for improvement regarding the congestion situation.

Table 6: Rush Ratio of Line 13

(Unit: %)

	2006	2007	2008	2009	2010
Rush Ratio	103	114	107	114	116

Source: answer to questionnaire

[8] Rush Ratio: the number of passengers per peak hour / transportation capacity per peak hour x 100
Transportation capacity per vehicle is larger in Beijing than that of equivalent size of vehicle in Japan.

(5) Maximum Speed and Operating Rate of Rolling Stocks

The maximum speed was planned as 80km/hour at the time of appraisal and the actual maximum speed in 2010 is 73km/hour[9], which is close to the planned figure. While there is no planned figure for the operating rate of rolling stocks, the actual rate at the time of ex-post evaluation is 73%, calculated from the fact that 41 units out of 56 units comprised of four-car trains are in operation[10]. However, according to the O&M organization, the number of units not in operation includes those in the process of inspection, and thus the operating rate of rolling stocks would be higher if those in inspection are deducted from the number of units not in operation.

(6) Required Time for Specific Sections (Effects of Shortening Travelling Time)

Time required for travelling by subway (Line 13) and by car was measured and compared, by actually travelling by taxi on roads that run parallel to the Line 13 from the Shangdi station to the Xizhimen station during the morning and evening rush hours on weekday. Travelling by subway (Line 13) from Shangdi to Xizhimen requires 13 minutes. As there are several routes that run parallel to the Line 13, two routes were selected; the Route 1: Xiaoying Bridge – Liudaokou – Xuezhi Bridge – Xizhimen, and the Route 2: Shangdi (south) – the East Gate of the Beijing University – Sitong Bridge – the Capital Gymnasium – Xizhimen. Travelling by taxi on the Route 1 and the Route 2 required 32 minutes and 52-55 minutes respectively[11]. The result cannot be generalized as the congestion situation on these routes would vary according to the day of the week and the time of the day, but there is a tendency that required time for travelling by subway (Line 13) is shorter than time required for travelling by cars.

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

(1) Financial Internal Rate of Return (FIRR)

While FIRR was estimated as 13.9% at the time of appraisal, due to the fact that data needed for quantitative analysis (yearly disbursement of project cost) was not available, analysis for FIRR was not possible.

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9 Source: O&M organization

10 Source: Same as above. The operating rate was calculated as 41 units in operation / 56 units in total x 100.

11 For the Route 1, the time measurement was conducted from Xiaoying Bridge starting at 8:00 on January 18th, Wednesday, to Xizhimen (32 minutes in total). For the Route 2, the first measurement was conducted from Shangdi starting at 8:00 on May 11th, Wednesday, to Xizhimen (52 minutes in total) and the second measurement was conducted from Xizhimen starting at 17:30 on May 13th, Friday, to Shangdi (55 minutes in total).

(2) Economic Internal Rate of Return (EIRR)

While EIRR was estimated as 19.8% at the time of appraisal, due to the fact that data needed for quantitative analysis (yearly disbursement of project cost, breakdown of benefits such as effects of reducing travelling time, that of reducing fatigue, that of reducing traffic accidents, and that of replacing buses) was not available, analysis for EIRR was not possible.

3.3.2 Qualitative Effects

Beneficiary survey was conducted in the ex-post evaluation[12]. Results are shown below.

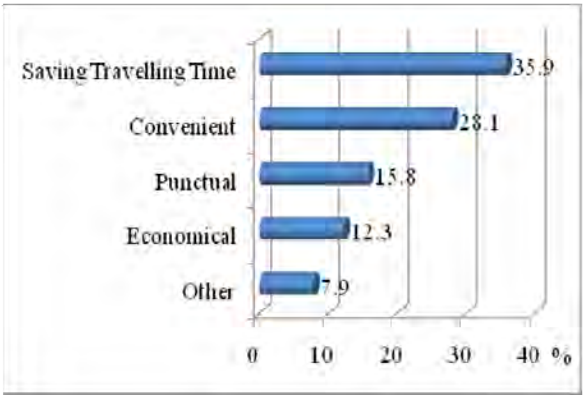


Figure 2: Reasons for Using Line 13

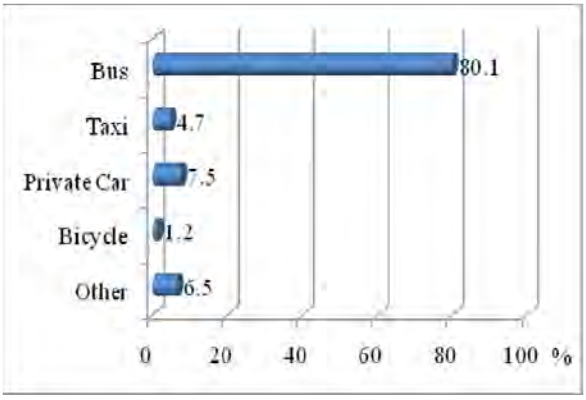


Figure 3: Transportation Used before Opening of Line 13

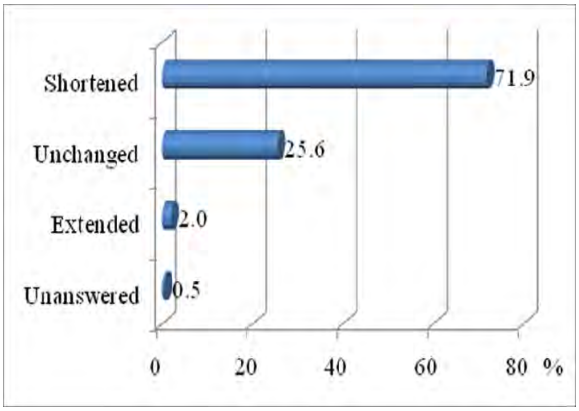


Figure 4: Travelling Time after Opening of Line 13

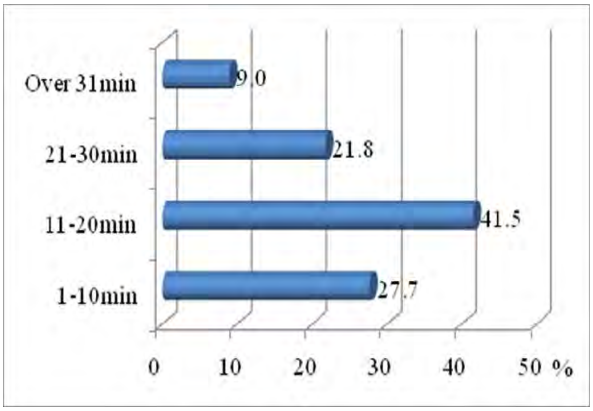


Figure 5: Travelling Time Reduced by Using Line 13

[12] Beneficiary survey was conducted on March 21-23, 2011, at Shangdi, Huilongguan, Lishuiqiao, and Wangjingxi stations. The number of valid response was 402.

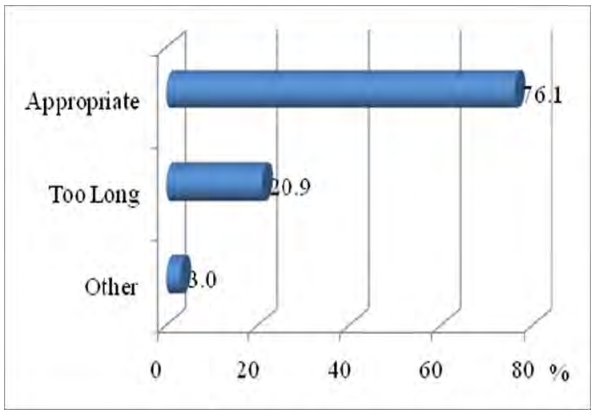


Figure 6: Operation Interval

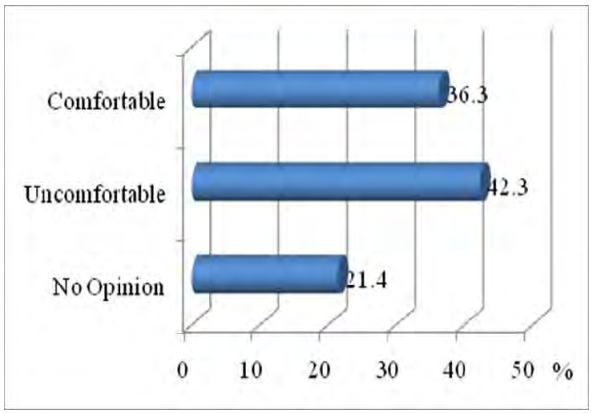


Figure 7: Congestion Situation of Line 13

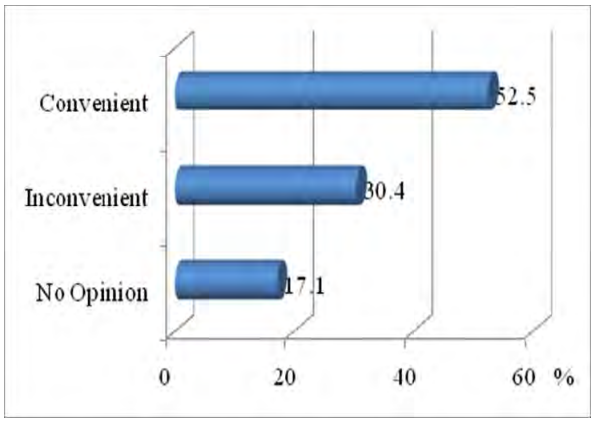


Figure 8: Connection with Other Lines

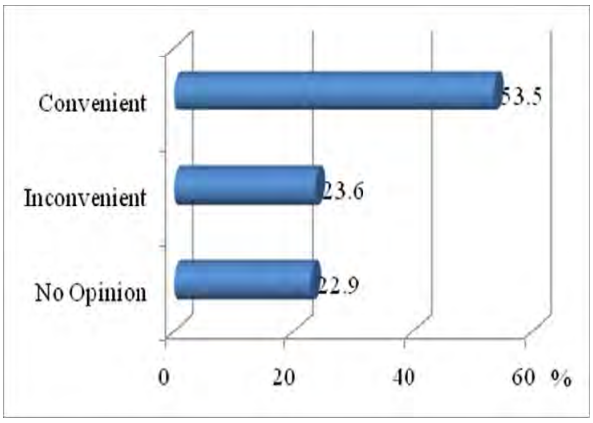


Figure 9: Connection with Other Transportation

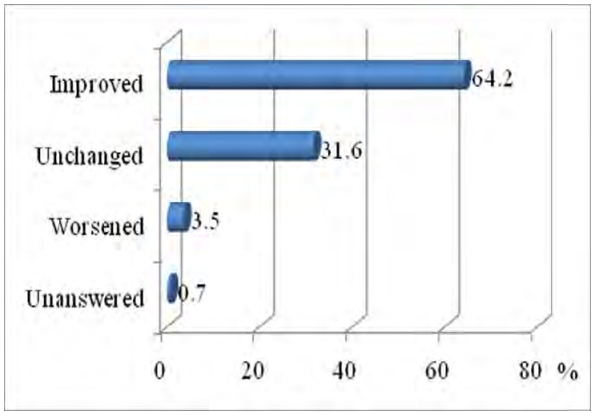


Figure 10: Traffic Congestion on Roads along Line 13

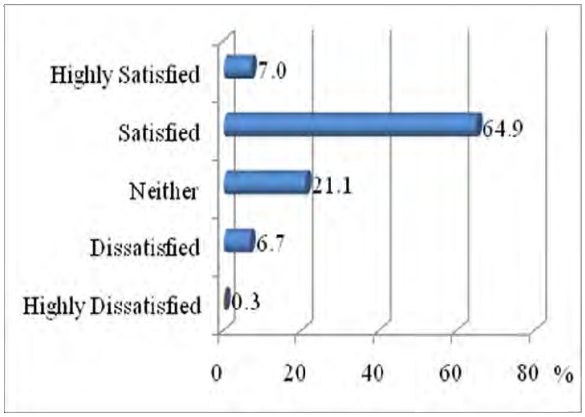


Figure 11: Satisfaction Level about Line 13

More than 70% of respondents replied that travelling time was reduced by using the Line 13, and more than 70% of respondents are satisfied with the project (Line 13), which indicates that there has been an improvement in transportation convenience for citizens due to the project. While it is not possible to completely eradicate traffic congestion of the Beijing City only by this project, more than 60% of respondents replied that traffic

congestion on roads along the Line 13 has been improved and about 12% of people who had used taxies and private cars before opening of the Line 13 shifted to the use of the Line 13, which suggests that this project has contributed to improvement of traffic congestion to some extent, as the congestion would have been worsened if the project had not been implemented.

On the other hand, there is a room for improvement regarding congestion of the Line 13 and connection with other lines and other transportation means, as the number of respondents who are satisfied with these aspects was almost half of the total (about 30% for congestion of the Line 13).

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

3.4 Impact

3.4.1 Intended Impacts

(1) Regional Development along the Line 13

Average housing prices along the Line 13 have been increasing, such as 5,720 RMB/m^2 in 2004, 7,980 RMB/m^2 in 2006, and 9,930 RMB/m^2 in 2007, as residential development has been promoted since the Beijing City centre and suburbs were connected by the Line 13. Particularly, the price increase in the area from Xi'erqi to Huilongguan has been remarkable, and the average sale price of houses in the area in 2007 was 10,842 RMB/m^2, which rose by 33.8% compared with the previous year, according to Zhongda-Hengji Research Centre of Real Estate Marketing. Moreover, while only small commercial buildings were seen around the Lishuiqiao Station previously, the Line 13 is now connected with the Line 5 at this station, and many famous restaurants and fashion brand shops are opened and a shopping centre is being constructed[13].

Residential Development near Lishuiqiao Station

The number of population in districts along the Line 13 has also been increasing, with the residential and commercial developments described above.

[13] Source: sg.com.cn: a popular information portal which posts various information related to life and culture in China, operated by Super-goods Network Technology Co. Ltd

Table 7: District Population along Line 13

(Unit: 10 thousand persons)

	2000	2008	2009
Chaoyang	152	308	318
Haidian	162	293	308
Changping	43	94	102

Source: Beijing Statistical Yearbook (2001, 2009, 2010)

In the beneficiary survey, approximately 70% of respondents replied that there has been development in areas along the Line 13, and they raised examples such as increases in the number of houses and shops, and rise in land prices, which supports the above tendencies. Results of the beneficiary survey are shown below.

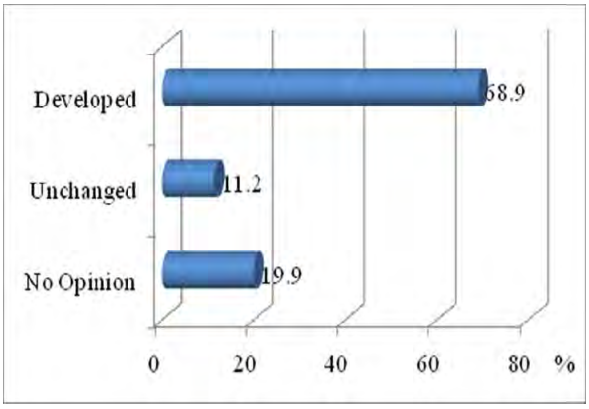


Figure 12: Regional Development along Line 13

Figure 13: Specific Examples of Development

(2) Reduction of Aerial Pollution

As the number of vehicles on major roads in the Beijing City has been increasing with the increase of passenger cars, it is difficult to indicate effects of the project on the reduction of aerial pollution along the Line 13.

3.4.2 Other Impacts

(1) Impacts on the Natural Environment

Major negative impacts on the natural environment were not seen in this project, however, in the beneficiary survey approximately 20% of respondents replied that there have been negative impacts caused by the project, and they raised noise problems for the reason[14]. Staff of the O&M organization also stated that local residents along the Line 13 complain to the Traffic Department of the Beijing City about noise problems, as noise prevention walls were not established along the Line 13 (they were provided for the Line 5).

[14] This is due to the fact that the underground station is only one out of 16 stations, and the other stations are either at grade or elevated.

According to the executing agency, necessary measures planned at the time of appraisal (keeping certain distances between rail tracks and houses) were taken, however, residential density in some areas has increased due to the population growth, which made it difficult to keep the necessary distance between rail tracks and houses, and caused noise problems. Actions are needed such as provision of noise prevention walls, and according to the executing agency, the Government of the Beijing City, the executing agency and residential developers are currently discussing the necessary measures to solve this issue.

(2) Land Acquisition and Resettlement

About 116ha of land was planned to be acquired and about 2,200 households (about 6,000 people) were planned to be resettled for the project at the time of appraisal. While the actual area of land acquired for the project is unknown, the actual number of households resettled was about 1,300 (about 4,000 people)[15]. The reasons for the reduction in number are unknown, as the executing agency did not have the information.

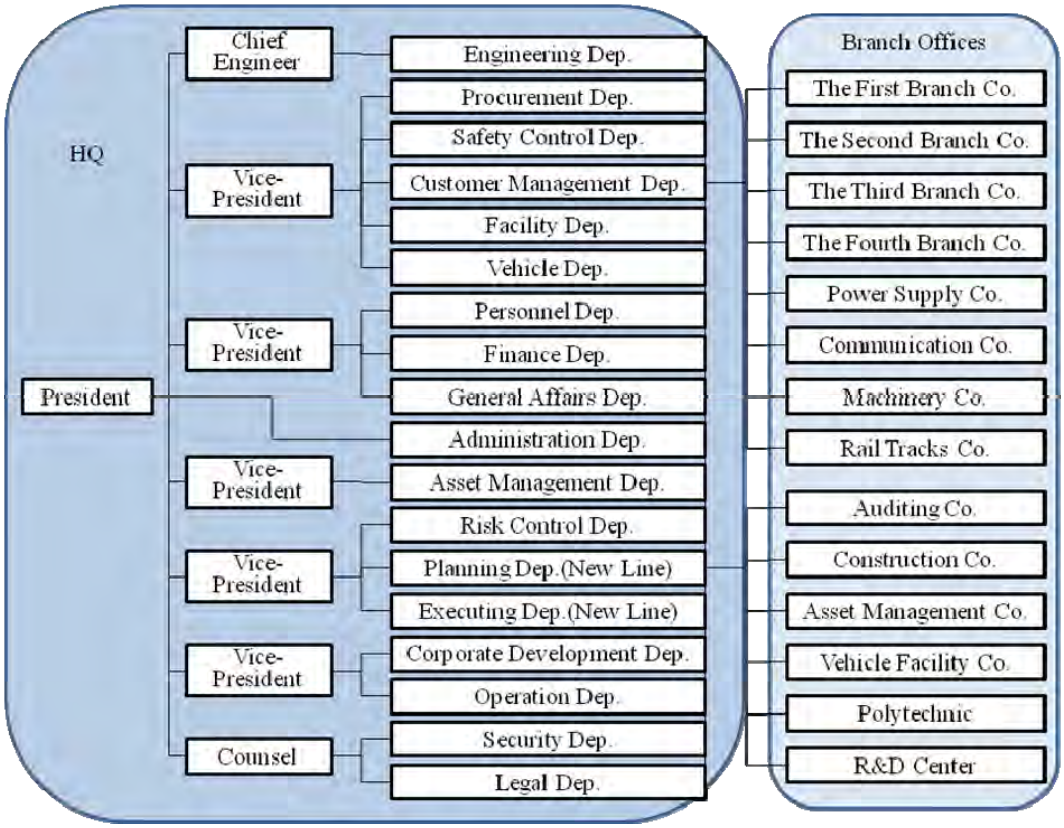
From the above, the overall goal of the project as contribution to regional development is mostly achieved.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

Beijing Mass Transit Railway Operation Co., Ltd. is responsible for O&M of the Beijing Subway as a whole and the Third Branch Company is responsible for O&M of the Line 13 (the Third Branch Company is responsible for Line 2, 8, 10, and 13). Below is the organization structure of Beijing Mass Transit Railway Operation Co., Ltd.

[15] Source: documents provided by JICA



Source: Beijing Mass Transit Railway Operation Co., Ltd. HP

Figure 14: Organization Structure of Beijing Mass Transit Railway Operation Co., Ltd.

The total number of employees of the Third Branch Company is 3,848, of which about 100 persons are involved in management of vehicles of the Line 13, about 600 persons are involved in management of passengers (station staff) of the Line 13, and about 300 persons are train operators of the Line 13. Sufficient numbers of staff are assigned and there is no problem in the O&M structure.

3.5.2 Technical Aspects of Operation and Maintenance

Beijing Mass Transit Railway Operation Co., Ltd. runs a polytechnic institute and most employees are graduates of the institute. Apart from this, trainings on O&M were provided by the contractor of the project in 2004, and Beijing Mass Transit Railway Operation Co., Ltd. conducts trainings on improvements in safety and service quality once a year for all employees. Problems on technical capacity of these employees were not observed during the interviews with them at the depot and manuals are provided for each facility.

3.5.3 Financial Aspects of Operation and Maintenance

Subway fare is 2 RMB for all sections including the Line 13. Tables below show revenue and O&M cost of the Line 13.

Table 8: Revenue of Line 13

(Unit: 10 thousand RMB)

Year	2006	2007	2008	2009	2010
Fare Revenue	19,777	20,548	18,755	22,256	24,953
Advertising Revenue	800	1,400	2,200	1,600	1,600
Total	20,577	21,948	20,955	23,856	26,553

Source: answer to questionnaire

Table 9: Operation and Maintenance Cost of Line 13

(Unit: 10 thousand RMB)

Year	2006	2007	2008	2009	2010
Cost	22,396	25,714	33,205	37,078	41,676

Source: answer to questionnaire

O&M cost is not covered by operating revenue of the Line 13, as subway fare is set low. However, the deficit is financed by the Government of the Beijing City. The table below shows the financed amount for the Line 13 by the Government for recent years. According to Beijing Mass Transit Railway Operation Co., Ltd., as the importance of the Beijing Subway including the Line 13 is very high for the purpose of improvement of transportation networks and reduction of traffic congestion in the Beijing City, financial support from the Government is expected to continue, and thus there seems to be no problem on financial aspects of O&M.

Table 10: Financed Amount for Line 13 from the Government of the Beijing City

(Unit: 10 thousand RMB)

Year	2008	2009	2010
Amount	39,824	14,518	16,599

Source: answer to questionnaire

3.5.4 Current Status of Operation and Maintenance

Routine inspection and repair (conducting appearance check of major parts and repairing parts that affect safe operation), periodic inspection and repair (overhauling, repairing and replacing electric equipments, braking systems and door systems etc), and major inspection and repair (overhauling and replacing electric equipments, braking systems and door systems etc, fixing and conducting performance recovery of vehicles) are conducted for procured rolling stocks. Regular inspection and repair are also conducted for other facilities such as power supply facilities, and platforms and inside of vehicles are kept clean.

No major problems have been observed in the O&M system, therefore sustainability of the project is high.

Vehicle in Inspection

Operation Room within the Depot

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Relevance of this project is high, as the project is consistent with priority areas of China's development plans and Japan's ODA policy, and moreover development needs for the project are high. Efficiency of the project is fair, as both project cost and period exceeded the plan while outputs of this project are almost as planned. Effectiveness of the project is high, as the project more or less achieved targets in major operation and effect indicators and beneficiaries showed high level of satisfaction with this project. The overall goal of the project, which is to contribute to regional development, has also been mostly achieved. Sustainability of the project is high, as no major problems have been observed in the O&M system, technical capacity and financial status of the O&M organization.

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) (Recommendation to the Government of the Beijing City)

This project has largely contributed to the improvement of transportation networks in the Beijing City, however, the percentage of beneficiaries who are satisfied with the status quo regarding connections of the Line 13 with other subway lines and other transportation means (such as buses) is only about 50%. While various measures are already being planned, for example, operating shuttle buses from Tiantongyuan Station of the Line 5 to areas along the line and providing parking areas called "park-and-ride" at stations connecting the Line 13 and Line 8, it is desirable to improve connections of the Line 13 and other transportation means, for example, by increasing the number of buses connecting stations of the Line 13 with residential areas along the line.

(2) (Recommendation to the Executing Agency)

As noise problems were raised in the beneficiary survey, it is desirable to provide noise prevention walls along the Line 13 as has been done for the Line 5.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Reasons for the steady increase of passengers of the Line 13 as planned would be various measures taken by the Government of the Beijing City to increase subway users such as a single fare system and restrictions on car use and purchasing cars, as well as the fact that many of other subway lines are in operation. While a single fare system might not be feasible in some cases as it makes it difficult to secure O&M budget, to implement various urban strategies together with a railway construction project would be of high value.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	・ Sections: Xizhimen – Dongzhimen ・ Route Length: 40.5km (underground 1.8km, at-grade 32.2km, elevated 6.5km) ・ No. of Stations: 16 (underground 1, at-grade 14, elevated 1) ・ No. of Depot: 1 ・ Rolling Stocks: 56 units ・ Train carried motors, train gear drive devices, train carried braking devices 56 sets ・ Processing and maintenance equipments 4 sets ・ Train carried air conditioners 448 sets ・ Signal system 1 set ・ Radio system 1 set ・ Transmission system 1 set ・ Automatic fare collection system 1set ・ SCADAR system 1 set ・ Heavy duty circuit breaker 370 sets ・ DC speed circuit breaker 100 sets ・ Comprehensive protecting devices for computers in propulsion power system 150 sets ・ Automatic fire alarm and extinguishing system 1 set	As planned As planned As planned As planned As planned As planned As planned As planned As planned As planned As planned As planned As planned 325 sets 168 sets 117 sets As planned
2. Project Period	October 1999 – July 2002 (34 months)	October 1999-September 2002 (36 months)
3. Project Cost Amount paid in Foreign currency Amount paid in Local currency Total Japanese ODA loan portion Exchange rate	 14,111million yen 58,614 million yen (4,727 million RMB) 72,725million yen 14,111million yen 1RMB = 12.4 yen (As of January 2000)	 8,108 million yen 81,191 million yen (5,646 million RMB) 89,299million yen 8,108million yen 1RMB = 14.38 yen (Average between October 2000 and January 2008)