Ex-Post Project Evaluation 2013:

Package I - 2

(Lao PDR, Thailand, Malaysia, Mongolia, Uzbekistan)

February 2015

JAPAN INTERNATIONAL COOPERATION AGENCY

JAPAN ECONOMIC RESEARCH INSTITUTE INC.

ERNST & YOUNG SUSTAINABILITY CO., 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 2011, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2010. 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.

February 2015
Toshitsugu Uesawa
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

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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.

Lao People's Democratic Republic

Ex-Post Evaluation of Japanese ODA Loan Project

"Greater Mekong Power Network Development Project (Lao PDR)"

External Evaluator: Hirofumi Azeta

Japan Economic Research Institute Inc.

0. Summary

The objective of the Project is to meet the growing electric power demand in the central-southern region of Laos, where the East-West Economic Corridor is located, by constructing 115kV transmission lines (about 300km) and substations, thereby contributing to the upgrading of electrification rates, industrial development and poverty reduction in the region. This project has been highly relevant to Laos's development plan, development needs, as well as Japan's ODA policy. Therefore its relevance is high. All target indicators (utilization factor of transmission lines, number and time of forced outages, transmission losses, and received energy at Pakbo substation) were achieved, and positive impacts of a stable power supply, such as an increase in production and employment at private companies, were observed. Therefore its effectiveness and impact are high. Although the project cost was within the plan, the project period exceeded the plan. Therefore efficiency of the project is fair. No major problems have been observed in the institutional and technical aspects of the operation and maintenance system, but some problems have been observed in terms of financial aspects of the executing agency. Therefore sustainability of the project effects is fair.

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

1. Project Description

Project location

Transmission lines constructed under the project

1.1 Background

At the time of appraisal, the electrification rate of Laos was only 35%. The Government of Laos subsequently set a target for increasing the electrification rate by 2020 as one of its national priorities. The electric power demand in Laos had been rapidly increasing, and witnessed an average annual growth rate of 12.8% from 1995 to 2002, and it was expected to grow at an average rate of 10% until 2020. The electrification rate in the central-southern region of Laos, where the East-West Economic Corridor is located[1], was expected to grow by an average rate of 13.1% per year, due to expected development in the mining and agriculture (including irrigation).

At the time of appraisal, there were four separate electricity transmission grids in Laos, which were not inter-linked. From the electricity transmission grid in the northern and central regions, including the capital city of Vientiane, surplus electricity was exported to Thailand, while the grid in central-southern region imported electricity from Thailand, because there were no any power plants supplying electricity to the grid. The terms of trade were not favorable for Laos, because the electricity import price from Thailand was higher than the export price to Thailand.

This project, the "Greater Mekong Power Network Development Project (Lao PDR)," was launched targeting the reduction of foreign currency expenditure through reducing electricity imports from Thailand, the provision of stable power supplies, and improvement of the electrification rate in the central-southern region in Laos by interconnecting the transmission grids in the northern-central region and the grid in central-southern region.

The 115kV transmission line constructed in this project was also expected to form a part of the Greater Mekong Sub-region electricity transmission grid, as it would be connected to the 500kV international electricity transmission grid through Thailand, Laos and Vietnam and to 115kV transmission lines between the southern region of Laos and Cambodia.

1.2 Project Outline

The objective of this project is to respond to the growing electric power demand in the central and southern region of Laos, where the East-West Economic Corridor is located, by constructing 115kV transmission lines between Pakxan and Pakbo (about 300km) and substations, thereby contributing to the upgrading of electrification rates, industrial development and poverty reduction.

[1] The 1,450km highway project which crosses four countries (Myanmar, Thailand, Laos and Vietnam) in the Greater Mekong sub-region. Road No.9 in Laos comprises a part of the East-West Economic Corridor.

Loan Approved Amount / Disbursed Amount	3,326 million yen / 3,326 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2005 / March 2005
Terms and Conditions	Interest Rate: 0.9%, Repayment Period: 30 years (Grace Period: 10 years), Conditions for Procurement: General Untied
Borrower / Executing Agency	Government of Lao People's Democratic Republic / Electricité du Laos (EDL)
Final Disbursement Date	January 2012
Main Contractor (Over 1 billion yen)	Mitsubishi Corporation (Japan) / J-Power Systems (Japan)
Main Consultant (Over 100 million yen)	Nippon Koei (Japan) / Tokyo Electric Power Company (Japan)
Related Projects	Japanese ODA Loan: - Nam Ngum Hydropower Project (Loan Agreement in 1974) - Nam Ngum Hydropower Project (II) (Loan Agreement in 1976) - Nam Leuk Hydropower Project (Loan Agreement in 1996) - Southern Region Power System Development Project (Loan Agreement in 2012) - Nam Ngum 1 Hydropower Station Extension Project (Loan Agreement in 2013) Grant Aid Project: - The Project for Rehabilitation of the Nam Ngum 1 Hydropower Station (Exchange of Note in 2002） Other international agencies and donors: World Bank - Southern Provinces Electrification Project - Lao Nam Theun 2 Power Project Asian Development Bank - Nam Leuk Hydropower Project - Power Transmission and Distribution Project - GMS Northern Power Transmission

	- GMS Nam Theun 2 Hydroelectric Project China - Nan Man 3 Hydro Power Project - Xexet 2 Hydropower Plant Project

2. Outline of the Evaluation Study

2.1 External Evaluator

Hirofumi Azeta, Japan Economic Research Institute Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: August 2013 - August 2014

Duration of the Field Study:

December 8 - December 21, 2013 and March 2 - March 8, 2014

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance to the Development Plan of Laos

3.1.1.1 Consistency with the Overall Policy

At the time of appraisal, the main policy agendas of the Fifth Five-year National Socio-Economic Development Plan (2001-2005), the overall policy of Laos, were poverty reduction, economic development and industry development. The expansion of the domestic electricity transmission grid was one of the strategies to achieve these policy agendas.

At the time of the ex-post evaluation, the overall policy of Laos was the Seventh Five-year National Socio-Economic Development Plan (2011-2015). This also aims at the expansion of electricity transmission grids, and targets the "integration of power grids between the Northern-Central and the Southern parts of the country with the 115 KV transmission lines systems" by 2015.

Therefore, the expansion of electricity transmission grids was an important policy issue at the time of both appraisal and ex-post evaluation.

3.1.1.2 Consistency with Sector Policy

At the time of the appraisal, the sector policy in Laos was the "Power Sector Policy Statement," issued by the former Ministry of Industry and Handicrafts

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

[3] ③: High, ②: Fair, ①: Low

(Ministry of Energy and Mines) and developed based on the Fifth Five-year National Socio-Economic Development Plan. One of the priority issues of the Power Sector Policy Statement was to preserve and expand a stable electricity power supply to achieve economic and social development. The expansion and improvement of electricity transmission grids was regarded as one measure to achieve this. In the Power Development Plan (2004-2013), the executing agency (Electricité du Laos, hereinafter referred to as "EDL") aimed at constructing 115kV transmission lines interconnecting the grids in northern and southern regions and developing power generation facilities to raise the household electrification rate to 70% by 2010 and 90% by 2020.

At the time of ex-post evaluation, the updated Power Development Plan (2010-2020) by EDL presented a plan to increase surplus electricity in the northern and southern regions by developing several power production facilities. As the Power Development Plan expects an electricity shortage of 5,172 GWh in 2020 in the central-southern region including Khammuane province and Savannakhet province, it is necessary to develop transmission lines connecting the electricity transmission grids in the northern region and southern region to the grid in the central-southern region.

Therefore this project, which developed the 115kV transmission line interconnecting the electricity transmission grid in the northern region to the one in the central-southern region, is relevant to the sector policy both at the times of project appraisal and ex-post evaluation.

3.1.2 Relevance to the Development Needs of Laos

At the time of appraisal, the electrical power demand in Laos was expected to grow by an average rate of 10% per year until 2020, and the demand in central-southern region, where East-West Economic Corridor is located, was expected to increase by 13.1% per year.

There were four separate electricity transmission grids in Laos, which were not inter-linked. From the electricity transmission grid in the northern and central areas, which includes the capital city of Vientiane, surplus electricity was exported to Thailand, while the grid in central-southern region imported electricity from Thailand, because there were no power producing facilities supplying electricity to the grid. The terms of trade between Laos and Thailand was not favorable for Laos, because the electricity import price from Thailand was higher than the export price to Thailand.

From 2005 to 2012, the electrical power demand grew by 15.7% per year due to rapid economic growth and rural electrification. At the time of ex-post evaluation, the

updated Power Development Plan by EDL estimated that the national power demand will increase by 25% per year by 2020[4], and that the power demand in the central-southern region, including Khammuane province and Savannakhet province, will increase by 33% per year.

Although the grid in the northern region was connected by 115kV transmission lines constructed in this project to the one in the central-southern region, the need for further enhancement of transmission capacity, including the connection of the grid in the southern region to the one in the central-southern region, was identified at the time of ex-post evaluation. Without improving transmission capacity, electricity imports to the central-southern region from Thailand are expected to increase significantly. The power shortfall in the central-southern region reached 5,127GWh due to the expanding power demand in the region, although surplus electricity in the northern and southern regions continues to increase.

The reduction in electricity imports from Thailand by enhancing the interconnection of the power grids was essential at the time of ex-post evaluation, because the terms of trade between Laos and Thailand were still not favorable for Laos. In 2012, the power import price from Thailand was THB 1.6/kWh (peak hours) and THB 1.2/kWh (off-peak hours), while the power export price to Thailand was THB 1.74/kWh (peak hours) and THB 1.34/kWh (off-peak hours). Thus, the import price is THB 0.14 higher than the export price.

This project was therefore relevant to development needs, including the need for a stable power supply and a reduction of electricity imports from Thailand, at the times of project appraisal and ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policy

At the time of appraisal, infrastructure development for economic development was one of the priority areas of the Medium-Term Strategy for Overseas Economic Cooperation Operations. It stressed the importance of support for economic infrastructure development including electricity. The Country Assistance Strategy for Laos also emphasized that the Japanese ODA loans were to support the development of power generating facilities and transmission networks for electricity export. The Country Assistance Strategy also mentioned that the reduction of electricity imports through the integration of the four separated domestic electricity transmission grids was important in order to reduce the outflow of foreign reserves from Laos.

This project, which constructed economic infrastructure (transmission lines and

[4] "The Study on Power Network System Plan in Lao PDR" by JICA in 2010 forecasted an average annual increase of 8.1%, while the "Future Energy Demand in Laos" by the Future Research Centre of Finland in 2012 forecasted an annual increase of 12%.

substations), aimed to increase the electrification rate in the central region of Laos, and also to reduce electricity imports to reduce the outflow of foreign reserves by interconnecting the separated domestic electricity transmission grids. Thus, this project was in conformity with the Medium-Term Strategy for Overseas Economic Cooperation Operations and Country Assistance Strategy at the time of project appraisal.

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

3.2 Effectiveness[5] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

At the time of appraisal, this project was expected to increase the electrical power delivered to Pakbo substation without increasing the overloads and losses of transmission lines. Target indicators were set for the utilization factor, number and time of forced outages, transmission losses, and amount of energy received at Pakbo substation. Although the targets for the indicators were set for three years after completion of the project (2014), the evaluation on effectiveness is made on the indicators for two years after completion of the project because the ex-post evaluation was conducted two years after completion of the project. The tables below show the target values of the monitoring indicators and their actual values.

Table 1: Utilization factor

Item	Target (3 years after completion)	Actual			
		Section	2011 (year of completion)	2012 (1 year after completion)	2013 (2 years after completion)
Utilization factor	Less than 100%	Pakxan – Pakbo	18.8%	18.9%	20.6%
		Thakek – Pakbo	12.5%	14.6%	16.3%

Source: Project Completion Report by the Executing Agency

The utilization factor (Peak demand / [Capacity of Transmission line x power factor]) met the targets, as it is below 100% in each section. This indicates that the transmission lines constructed in the project were not overloaded at the time of ex-post evaluation.

[5] Sub-rating for Effectiveness is to be put with consideration of Impact.

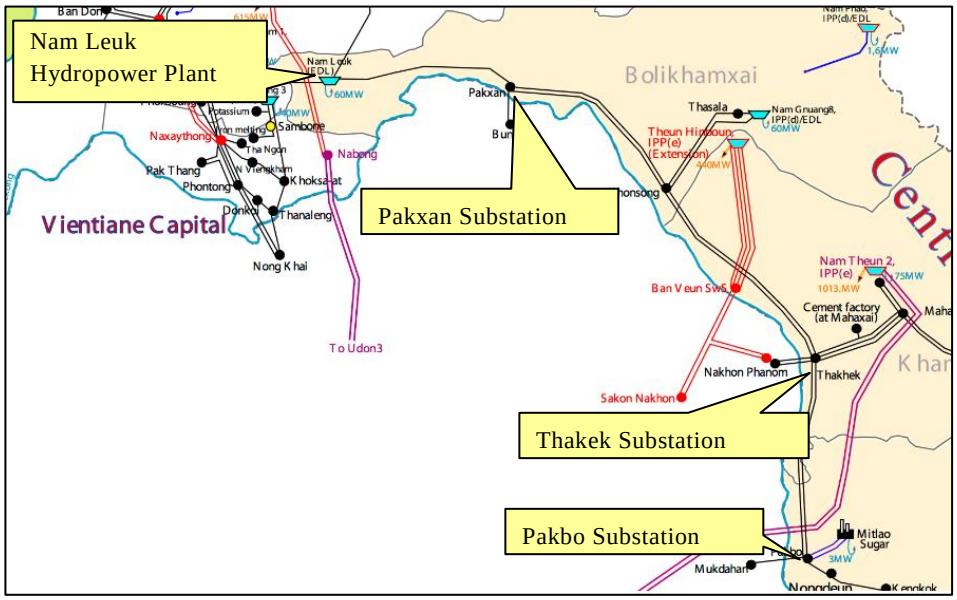


Figure 1: Transmission network

However, the utilization factor of the transmission lines was as low as 20% in 2013. The low utilization factor is mainly because the electricity power inflow from Nam Leuk hydropower plant into Pakxan substation was less than expected. The Power Development Plan (2004) by EDL indicated that the transmission line between Nam Leuk hydropower plant and Pakxan was planned to be enhanced by constructing another circuit in addition to the existing single circuit by 2010. However, the enhancement of this transmission line was not completed before this ex-post evaluation. Another possible reason for the low utilization factor of the transmission line is that surplus electricity in the central region, where the capital city of Vientiane is located, was less than the initial estimations, mainly due to the significant increase in the electric power demand in the region. Furthermore, the electric power supply from the northern and central region was smaller than expected as the development of the power generating facilities in the region was delayed.

The Government of Laos has conducted negotiations with the Chinese government regarding support for the construction of an additional transmission line between Nam Leuk hydropower plant and Pakxan substation. A feasibility study was started in 2012 under the support of China, and construction of the transmission line is expected to be completed by 2016.

Table 2: Annual forced outage (number and time) and transmission loss

Item	Target (3 years after completion)	Actual			
		Section	2011 (the year of completion)	2012 (1 year after completion)	2013 (2 years after completion)
Annual forced outage (number and time)	8 times /1 hour	Pakxan - Thakek	0 time / 0 minute	1 time / 1 minute	5 times / 12 minutes
		Thakek - Pakbo	1 time / 1 minute	3 times / 1 minute	3 times / 13 minutes
		Transformer	0 time / 0 minute	0 time / 0 minute	8 times / 25 minutes
Transmission loss	Within 4%	Sending from Pakxan to Pakbo	1.90%	1.60%	1.66%
		Sending from Thakek to Pakxan	2.30%	2.10%	2.80%
		Sending from Thakek to Pakbo	1.30%	1.10%	3.81%
		Sending from Pakbo to Thakek	0%	0%	0%

Source: Project completion report

The actual number and time of annual forced outages, or unplanned power cuts, was within the targets (planned power cuts are for the maintenance purposes). As the reason for the forced outages was lightning strikes during rainy seasons, the numbers and time of unplanned power cuts are determined by weather conditions.

The targets for transmission loss were also achieved, mainly because the number and time of forced outages was limited[6].

Table 3: Power received at Pakbo substation

(GWh)

Item	Target			Actual		
	2009 (1 year after completion)	2010 (2 years after completion)	2011 (3 years after completion)	2011 (Year of completion)	2012 (1 year after completion)	2013 (2 years after completion)
Power received at Pakbo substation	195	201	206	86	165	235

Source: Project completion report

The actual power received at Pakbo substation in 2013 (2 years after completion of the project) was 235GWh, which is more than the target for 3 years after project

[6] When the utilization factor of a transmission line is low, transmission loss is also low. Therefore, actual transmission loss would have to be lower than indicated in Table 2, and the information provided by the executing agency might be incorrect. However, because no significant problems have been identified in the operation of transmission lines and substations, transmission losses are estimated to be at the appropriate level.

completion (206GWh).

3.2.2 Qualitative Effects

At the time of project appraisal, the project was expected to enhance the economic activities such as industrial and agricultural development on the region and consequently the living standards of the people in the central-southern region of Laos, where the East-West Economic Corridor is located, through a stable power supply. These effects will be analyzed in the following "Impact" section as they were regarded as impacts of the project in the ex-post evaluation survey.

3.3 Impact

3.3.1 Intended Impacts

3.3.1.1 Enhancement of economic activities in the central-southern region

In this ex-post evaluation, the external evaluator carried out a simple beneficiary survey, and had interviews with 20 business owners in the central and southern region of Laos (Savannakhet province and Khammuane province)[7]. 19 interviewees out of 20 answered that they recognize the increase in the power supply and improvement in the stability of the power supply[8]. Some interviewees answered that they established new factories or increased their production at existing factories, because the power supply was more stable after completion of the project. Other interviewees also answered that they increased their number of employees following the increase in production.

Photo 1: Savan – Seno Special Economic Zone (Savannakhet province)

In Savannakhet province, the development of the Savan-Seno Special Economic Zone (Zone C) was completed after completion of the project. As of December 2013, 10 factories had been constructed or were under construction, while another 25 companies have already signed a memorandum of understanding with the special economic zone. Several factories which have already started operations answered that their main reason for establishing factories in the Savan-Seno Special Economic

[7] All interviewees are manufacturing companies. Major questions were (i) whether the power supply increased after completion of the project, (ii) whether the number of power outage was reduced, (iii) whether production and employment increased after completion of the project.

[8] The remaining one company is located far from substations. Because of the problems in the distribution network, this company could not acknowledge an improvement in the power supply.

Zone was the stable power supply in Savannakhet province.

3.3.1.2 Improvement in living standards in the central-southern region

Socioeconomic indicators in the central-southern region of Laos at the time of appraisal and ex-post evaluation are as follows.

Table 4: Socioeconomic indicator in the central-southern region

		2005	2012
Electrification rate	Khammuane province	59%	83%
	Savannakhet province	57%	79%
Per capita GDP	Khammuane province	USD 428	USD 1,490
	Savannakhet province	USD 525	USD 1,469
Poverty rate	Khammuane province	20%	5%
	Savannakhet province	20%	11%

Source: Data provided by the Executing Agency

The transmission lines constructed by this project have provided electricity to the power distribution network in the central-southern region, which has been expanded by EDL under several donor funded projects including the World Bank. Therefore, this project contributed to the enhancement of power distribution and improvement of electrification in the region.

In the beneficiary survey of this ex-post evaluation, several interviewees answered that they have expanded the production of their factories and increase the number of employees. Therefore, it is possible to say that this project has contributed to the creation of jobs in the region, and consequently the increase in per capita GDP, poverty rate reduction, and improvement in living standards in the region.

3.3.1.3 Reduction in power imports from Thailand

Although the electricity transmission grid in the central-southern region was connected with the grid in northern region, the power inflow and outflow between Laos and Thailand did not change significantly. Even after completion of the project, electricity has been imported from Thailand through Thakek substation, while the electricity produced in the northern and central regions was exported to Thailand from Pakxan substation and Pakbo substation, even during the seasons when Laos had a surplus electricity for exports. This is because the transmission line connections between Laos and Thailand at Pakxan substation, Thakek substation and Pakbo substation were maintained as before, following the contract between EDL

and Electricity Generating Authority of Thailand (EGAT).

EDL started controlling electrical power flow in the domestic transmission grid in September 2013 by cutting or connecting several transmission line connections, in accordance with the daily and regional power demand. EDL then started reducing power imports from Thailand by sending the electricity produced in the central-southern region to Thakek substation, where a large amount of electrical power has been imported from Thailand. As depicted in Figure 2, the amount of electrical power imports shows a decrease from September 2013.

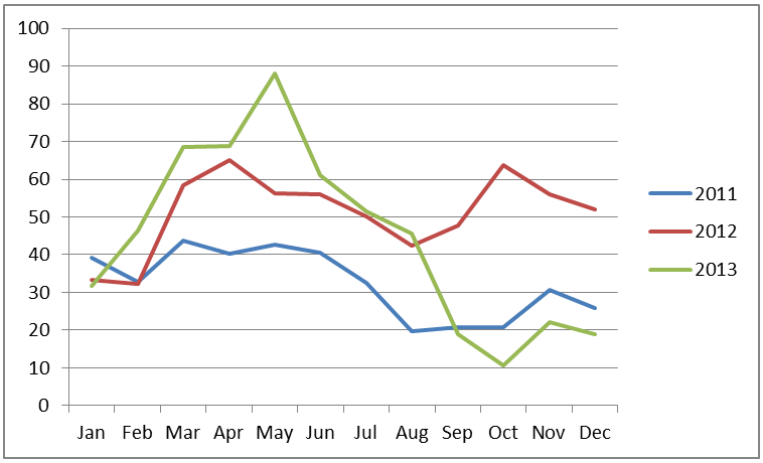


Figure 2: Amount of monthly electrical power import (GWh)

Source: Data provided by the Executing Agency

Note: The total amount of electrical power imports at Pakxan substation, Thakek substation and Pakbo substation

3.3.2 Other impacts

3.3.3.1 Impacts on the Natural Environment

At the time of appraisal, no negative impacts on the natural environment were expected. As a sector, characteristics and regions of this project did not fall into any category of possible negative impacts on the natural environment. The transmission line route did not include any protected forests or habitats of rare species, nor was large-scale logging of the dense forests planned.

The environmental monitoring survey conducted by EDL in May 2012 confirmed that no significant negative impacts on the natural environment, including large-scale logging, were brought about by this project. The survey also confirmed that the construction site of this project was restored to its original state, and no water pollution, air pollution or noise was caused by this project. According to the information given by the EDL officers in each province visited during the site survey,

no problematic environmental impacts occurred either during or after the construction. No such impacts were observed when the evaluator visited the project sites. Therefore it can be concluded that no negative impacts on the natural environment were caused during implementation nor have any been observed after completion of the project.

3.3.3.2 Land Acquisition and Resettlement

At the time of appraisal, land acquisition of about 750ha (715.5ha out of 750ha was only for the construction period) and resettlement of 22 households was planned. Compensations for land acquisitions and resettlements were planned to be determined through negotiations between affected residents and provincial environmental monitoring committees.

In the ex-post evaluation, it was confirmed that the transmission routes were adjusted in order to reduce land acquisition and resettlement. Eventually, the land acquired for this project was 3.5ha (excluding temporary land acquisition), and the number of houses resettled was two. In order to reduce land acquisition for the transmission line tower, some existing towers for two circuits were replaced by new towers for four circuits.

Compensation amounts were determined in each province by provincial governors and provincial environmental monitoring committees. Compensations were paid to land users, upon the conclusion of memorandums of understanding between land users, EDL and environmental monitoring committees. Therefore, it was concluded that compensation payments were made appropriately.

3.3.3.3 Poverty reduction

At the time of appraisal, the World Bank was carrying out a project on the expansion of the distribution network in the central-southern region, and the transmission line constructed by this project was expected to contribute to reducing poverty in the region by improving the electrification rate, which was made possible by the provision of electricity to the distribution network developed by the World Bank project.

Prior to the ex-post evaluation, the World Bank implemented the “Southern Provinces Rural Electrification Project (SPRE)”, “Second Southern Provinces Rural Electrification project (SPRE2),” and “Rural Electrification Project (REP)” to enhance the power distribution network in several provinces including Khammuane province and Savannaket province. In the central–southern region, electricity is supplied by the distribution network through the transmission lines constructed in

this project. Therefore, this project is determined to have contributed to the improvement of electrification in the central-southern region. The electrification rate increased in Savannakhet province from 40.4% at the time of appraisal to 83.1% at the time of ex-post evaluation. The electrification rate in Khammuane province also increased from 42.9% to 85.0% during the same period.

As mentioned above, the stable power supply achieved by this project, has increased the per capita GDP in the central-southern region through the increase in factory production and job creation. The increase in per capita GDP consequently decreased the poverty rate in the region. The poverty rate decreased in Savannakhet province from 20.1% at the time of appraisal to 10.7% at the time of ex-post evaluation. The poverty rate in Khammuane province also decreased from 19.6% to 5.0% during the same period.

Base on the above results, this project is concluded to have largely achieved its objectives; therefore, its effectiveness and impact is high.

3.4 Efficiency (Rating:②)

3.4.1 Project Outputs

The final outputs and the original plans are compared in Table 5 below.

Table 5: Comparison of Original and Actual Outputs

Component	Original	Actual
Construction of transmission lines	Construction of double circuits of 115 kV transmission lines from Pakxan through Thakhek to Pakbo (about 300km, ACSR)	Construction of double circuits of 115 kV transmission lines from Pakxan through Thakhek to Pakbo (284km, TACSR)
Extension of 115/22kV substations	Construction of 115kV outdoor transmission feeder bays, installation of protective relay system, extensions of communication and SCADA system at Pakxan substation, Thakhek substation and Pakbo substations	Construction of 115kV outdoor transmission feeder bays, installation of protective relay system, extensions of communication and SCADA system at Pakxan substation, Thakhek substation and Pakbo substations
Consulting services	Design work, procurement assistance, construction supervision, etc.	Design work, procurement assistance, construction supervision, etc.

Source: Project completion report

In this project, as the lowest bid price exceeded the planned price, the number of the transmission line circuits from Thakek to Pakbo was reduced from two to one in order to reduce project costs. However, as the total cost in Japanese yen decreased due

to appreciation of the yen, the number of transmission line circuits was again increased from one to two.

The overall length of the transmission line of this project was shortened from 300km to 284km. This is mainly because the transmission line route from Thakek substation to Pakbo substation was revised. In the initial plan, the transmission line was planned to be constructed along Road No. 13. However, the transmission line was constructed along another road along the Mekong River that was paved during the project implementation.

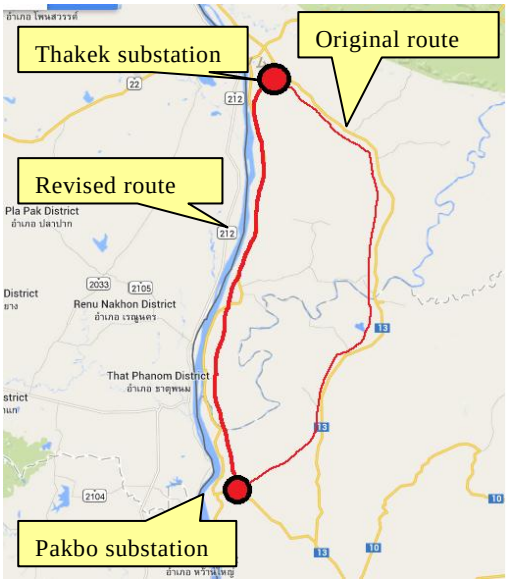


Figure 3: Original and revised route

The type of cable of transmission lines were changed from ACSR (Aluminum-Conductor Steel-Reinforced) to TASCR (Thermal All Aluminum-Conductor Steel Reinforced) as per a request by EDL. The cable type was changed to allow for electric currents of 700A, which were designated by the electricity demand forecast conducted in the revision process of the Power Development Plan in 2006-2007.


Photo 2: A transmission line tower for 4 circuits (Near Pakxan substation)

In addition, the specification of several transmission line towers was changed from a tower for 2 circuits to a tower for 4 circuits. This is because there were existing transmission line towers near the transmission line route of this project, and some existing towers were replaced by 4 circuit towers to reduce land acquisitions for new towers. Therefore all revisions made in the project were concluded to be appropriate.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The planned project cost was 3,914 million JPY. (3,326 million yen was to be provided by a Japanese ODA loan.) The actual project cost was 3,787 million JPY (3,326 million yen was provided by a Japanese ODA loan), which was 97% of original project cost.

The cost covered by the Lao side decreased from 588 million yen to 461 million yen, mainly because the Lao side decided to exempt taxes and customs for the project, which were regarded as the costs of Lao side, as a result of discussions between EDL and customs authorities during project implementation.

3.4.2.2 Project Period

The planned project period was 45 months (from March 2005 to November 2008), and the actual project period was 74 months (from March 2005 to April 2011). The actual project period was 164% of the original project period.

Table 6: Comparison of Original and Actual Project Periods

	Original	**Actual**	**Comparison with the Original Plan**
Selection of consultants	April 2005 - July 2005	June 2005 -January 2006	+ 2 months
Procurement of contractors	April 2006 - December 2006	February 2006 - August 2008	+22 months
Design and Construction	December 2006 - December 2008	October 2008 - April 2011	+7months
Total project period	March 2005 - November 2008 (45 months)	March 2005 - April 2011 (74 months)	164％of the original

Source: Project completion report

Project implementation was delayed mainly because the selection of contractors took 22 months more than the initial plan. In the first bidding, only one price proposal was opened, and the cost was much higher than the budget of the project. This bidding was canceled and the project moved into the second bidding. In the second bidding, some scopes of the project were excluded and two price proposals were opened. As a result, the lowest bidder won the contract, as the amount was within the budget.

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

The Economic Internal Rate of Return (EIRR) calculated by the Executing Agency at the time of the appraisal of this project was 19.1%, and the Financial Internal Rate of Return (FIRR) was 8.9%. Due to the fact that some pre-conditions of the calculations at the time of appraisal were not clear, and data needed for re-calculation was not available to the execution agency at the time of ex-post evaluation, an analysis for the internal rate of return was not possible.

Base on the above results, although the project cost was within the plan, the project period exceeded the plan. Therefore efficiency of the project is fair.

3.5 Sustainability (Rating:②)

3.5.1 Institutional Aspects of Operation and Maintenance

Operation and maintenance (hereinafter referred to as "O&M") of the transmission lines and substations constructed or augmented in this project is the responsibility of EDL. The total number of the employees at EDL as of 2012 is 3,583.

At the time of appraisal, branches in provinces under the Distribution Department were in charge of the O&M of transmission lines and substations. However, at the time of ex-post evaluation, O&M falls under the responsibility of the Transmission Line and Substation Monitoring Department at the head office. The change in the department in charge of O&M is due to organizational reforms implemented in 2012.

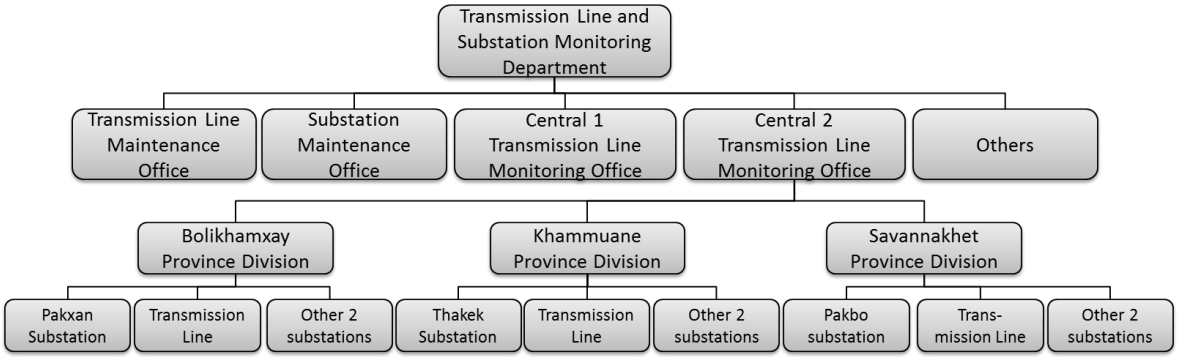


Figure 4: Transmission Line and Substation Monitoring Department organizational chart of EDL

In the Transmission Line and Substation Monitoring Department, Central 2 Transmission Line Monitoring Office is in charge of the O&M of the transmission lines and substation constructed in this project. Actual O&M work is carried out by a division in each province (Bolikhamxay Province Division, Khammuane Province Division, and Savannakhet Province Division). The number of the staff members in one provincial division is 40.

At each substation including Pakxan substation, Thakek substation and Pakbo substation, 10 technical staff members are stationed. The number of the staff members at each substation was increased by 4 people (for one shift).

10 staff members are in charge of the maintenance of the Pakxan-Thakek transmission line, and another 10 staff members are in charge of the Thakek-Pakbo transmission line. They are either newly recruited staff or staff members transferred

from other substations.

The organizational structure of the O&M of transmission lines and substations, including the responsibilities of the Transmission Line and Substation Monitoring Department in O&M is clear. Staff for the O&M at substations and transmission lines have been assigned as planned. Therefore no major problems were identified in the institutional aspects of O&M.

3.5.2 Technical Aspects of Operation and Maintenance

At the time of appraisal, the technical capacities of EDL for O&M were regarded to be sufficient, as it had experience in the maintenance of 115kV transmission lines constructed by the World Bank and Asian Development Bank (hereinafter referred to as ADB).

At the time of ex-post evaluation, the division in charge has been carrying out regular (daily and yearly) monitoring of substations and transmission lines. Each provincial division has formed 3 teams (3 staff members per team) and has visited transmission line towers to check conditions every day. At substations, engineers have carried out regular monitoring, recorded the results of the monitoring, and submitted weekly and monthly reports to the Central 2 Transmission Line Monitoring Office.

When problems occur at substations, engineering staff at the substation will first check the problems and fix them if they are not serious. If problems or accidents occur at substation facilities, a Repair Unit of the Central 2 Transmission Line Monitoring Office deals with the problems. When problems are so serious that the Central 2 Transmission Line Monitoring Office cannot fix them, Substation Maintenance Office at the head office will resolve them. Similarly, if problems occur in transmission lines, the engineering staff of the provincial division will examine the problems and fix them if they are not serious. If the problems are serious, the Transmission Line Maintenance Department at the head office deals with them. No problems were identified in EDL's capacity for maintenance of substations and transmission lines, as any problems or accidents that have occurred at the substations or transmission lines were solved in a short period of time.

EDL has been enhancing the technical skills of engineering staff through training at EGAT in Thailand and at the training center of EDL. In 2011, 16 staff members in charge of transmission lines received training at EGAT and the EDL training center, while 30 staff members in charge of substations received training at the EDL training center. This training has been organized every year, and a similar number of staff has received training. In addition to the training at EGAT and the EDL training center, each department has been striving to enhance the technical skills of staff through

On-the-Job-Training.

However, there is some room for improvement in the training, as the training courses are not separated for transmission and for distribution. Training is not separated for the work function of staff (e.g. managers, engineers) either. Therefore the training curriculum is too general and sometimes includes contents which are not appropriate to the work functions of trainees.

3.5.3 Financial Aspects of Operation and Maintenance

At the time of appraisal, the financial soundness of EDL was confirmed based on its financial statements in 2003. EDL had been trying to improve its financial status based on the financial restructuring plan formulated in 2000 under the support of the World Bank and ADB. The operating profits of EDL had increased, corresponding to the increase in the amount of electricity sales and the increase in electricity tariffs.

The World Bank and ADB set financial covenants on the financial indicators of EDL, allowing EDL to continue its efforts to improve its financial status. The financial indicators and targets included in the covenants are (i) Debt to Equity Ratio (Below 1.5), (ii) Self-Financing Ratio (Over 30%) and (iii) Debt Service Coverage Ratio (Over 1.5). In the appraisal, it was expected that EDL would not violate the covenants if it revised electricity tariffs appropriately.

The financial status of EDL at the time of ex-post evaluation is as shown in Table 7. Deterioration in the financial status of EDL can be observed from the table.

Table 7: Financial status of EDL

(Unit: billion LAK)

	2003	2010	2011	2012
Revenue	521	1,689	1,952	2,435
Cost of sales	-	-1,070	-1,903	-2,214
Gross profit	-	619	49	220
(Gross profit margin)		(36.6%)	(2.5%)	(9.0%)
Administrative expenses	-	-503	-454	-553
Profit (loss) from operations	73	116	-404	-332
Non-operating profit	161	180	331	1,280
Non-operating expenses	-62	-133	-136	-106
Current profit	173	163	-209	841
Extraordinary income	-	34	52	37
Profit before income tax expenses	173	197	-157	879
Income tax expenses	-22	-35	-46	-212
Net profit (loss) for the year	151	162	-203	666

	2003	2010	2011	2012
Current assets	552	705	721	1,111
Non-current assets	5,496	8,281	12,019	15,360
Total assets	6,048	8,987	12,740	16,471
Current liabilities	231	876	1,818	3,004
Non-current liabilities	1,840	2,609	5,485	7,281
Total liabilities	2,070	3,485	7,302	10,286
Total shareholder's equity	3,978	5,502	5,438	6,185
Total liabilities and shareholder's equity	6,048	8,987	12,740	16,471

Source: Financial Statements of EDL

EDL posted operating losses in 2011 and 2012, although its revenue had increased. This is mainly due to the increase in the cost of sales in 2011. The cost of sales increased because several power plants were transferred from EDL to its subsidiary, EDL-Generation Public Company[9] in December 2010. After transferring the power plants, EDL started purchasing electricity from EDL-Generation Public Company and paying electricity charges.

As a result of the increase in the electricity tariff in 2012, the gross profit margin

[9] EDL-Generation Public Company is one of the first listed companies in Lao Stock Exchange. It was established in December 2010.

of EDL increased from 2.5% in 2011 to 9.0% in 2012. However, because the profit margin was still small compared to the administrative expenses, EDL posted operating losses in this year. EDL posted non-operating profit by selling stocks of its subsidiaries, and achieved net profit goals in 2012. The net profit of EDL for 2013 is expected to be LAK 83 billion, according to further tariff increases.

Table 8: Electricity tariff

	Average electricity tariff (Kip/ kWh)	**Annual increase**
2003	402	9%
2004	492	22%
2005	510	4%
2006	517	1%
2007	523	1%
2008	542	4%
2009	547	1%
2010	559	2%
2011	559	0%
2012	622	11%

Source: EDL Statistical Yearbook

The financial covenants set by the World Bank and ADB at the time of appraisal and actual financial indicators are as shown in Table 9.

Table 9: Financial covenants and actual financial indicators

	Financial covenants		**Actual**				
	At the time of appraisal	**Revised**	**2003**	**…**	**2010**	**2011**	**2012**
Debt to Equity Ratio	Below 1.5	Below 1.5	0.5		0.6	1.3	1.7
Self-Financing Ratio	Over 30%	Over 30%	45%		N/A	5%	8%
Debt Service Coverage Ratio	Over 1.5	Over 1.3	2.13		0.8	-0.3	2.2

Source: Calculated based on financial statements of EDL

Notes:

Debt to Equity Ratio = Debt / Equity

Self-Financing Ratio =(Electricity charge - Total debt service) / Annual average capital expenditures(of last three years)

Debt Service Coverage Ratio = Earnings before interest, tax, depreciation and amortization / Total debt service

The target financial indicators set in the financial covenants were generally

deteriorating, due to the decrease in the profitability. The target for the Debt to Equity Ratio (below 1.5) was not achieved, as it increased from 0.6 in 2010 to 1.7 in 2013. The deterioration in the Debt to Equity Ratio was mainly because EDL financed its capital investment by increasing its debt. As can be seen from the low level of the Self-Financing Ratio, EDL did not have enough funds (generated by income) for capital investment. The Debt Service Coverage Ratio also did not meet targets in 2010 and 2011. Therefore, the debt burden and debt service of EDL is becoming quite grave.

The budget allocation amount for O&M was 93,106 million LAK (4.77% of annual revenue) in 2011 and 108,157 million LAK (4.44% of annual revenue) in 2012. Through interviews with the Central 2 Transmission Line Monitoring Office, it was confirmed that a sufficient amount of budget has been allocated for O&M, and there have not been any problems in transmission lines or substations going unrepaired because of the lack of O&M budget.

3.5.4 Current Status of Operation and Maintenance

Through interviews with the staff of the Central 2 Transmission Line Monitoring Office, which is in charge of monitoring transmission lines and substations, it was confirmed that there have not been any problems or failures that have gone unrepaired for long period of time. The staff has carried out regular maintenance, and problems have been reported to the head office immediately and fixed within a short period.

However, if there are sudden problems or accidents at substations, it might take more than a month to fix the problem, because some spare parts have to be purchased in other countries. In the ex-post evaluation, it was confirmed that EDL does not always keep all spare parts on hand, and that the inventory list of spare parts at EDL was not updated. Therefore, inventory management of spare parts at EDL has room for improvement.

Based on the above results, it is concluded that there some problems in terms of financial aspects. Therefore sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of the Project is to meet the growing electric power demand in the central-southern region of Laos, where the East-West Economic Corridor is located, by constructing 115kV transmission lines (about 300km) and substations, thereby contributing to the upgrading of electrification rates, industrial development and poverty reduction in the region. This project has been highly relevant to Laos's development plan,

development needs, as well as Japan's ODA policy. Therefore its relevance is high. All target indicators (utilization factor of transmission lines, number and time of forced outages, transmission losses, and received energy at Pakbo substation) were achieved, and positive impacts of a stable power supply, such as an increase in production and employment at private companies, were observed. Therefore its effectiveness and impact are high. Although the project cost was within the plan, the project period exceeded the plan. Therefore efficiency of the project is fair. No major problems have been observed in the institutional and technical aspects of the operation and maintenance system, but some problems have been observed in terms of financial aspects of the executing agency. Therefore sustainability of the project effects is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

If there are sudden problems or failures at substations, it might take more than a month to fix the problem, because some spare parts have to be purchased in other countries. Therefore, it is recommended that the Executing Agency improves its inventory management for spare parts and reporting, in order to be prepared for any sudden serious problems.

The current training course at the EDL Training Center for distribution and transmission is recommended to be separated into two courses: one for distribution and one for transmission. Training should be also separately provided for managers and engineers, to allow for more needs-oriented courses.

4.2.2 Recommendations to JICA

Because the financial status of the executing agency is generally deteriorating, JICA should continue monitoring its financial status in collaboration with other donor agencies, including the World Bank.

The increase in electricity imports from Thailand leads to further deterioration in financial status of EDL. This is due to the fact that these electricity imports from Thailand have rapidly increased, and the import price from Thailand is set higher if the import amount exceeds the export amount to Thailand. Therefore JICA is recommended to confirm that the development of power generating facilities indicated in the Power Development Plan is progressing on schedule, by regularly checking the expected completion timing of power plants in the Plan.

4.3 Lessons Learned

4.3.1 Confirmation of the achievability and realistic schedule of related projects

In the project, the utilization factor of the transmission line was low, because the power inflow to the transmission line was small compared to the plan. This is due to the delay in other transmission line development projects and hydropower plant development projects, which were supposed to provide electricity to the transmission line constructed in this project. Therefore, at the time of appraisal, it is important to examine the level of achievability of other related projects and if they have realistic implementation schedules by ascertaining them with their respective executing agencies and donor agencies. It is also necessary to encourage executing agencies to complete related transmission line development at the appropriate timing, so that effectiveness of the entire domestic transmission network can be secured.

4.3.2 Improvement in the training program of the Executing Agency

When implementing similar project to this, it is important to improve training programs of executing agencies to allow for more needs-oriented courses, in order to secure their technical capacity in operation and maintenance. For example, training programs should be provided separately according to the scope of work of trainees (e.g. transmission maintenance and distribution maintenance) and the positions and work functions of the trainees (e.g. managers and engineers). It is also recommended that a capacity-building program for inventory management is included in training programs. Providing support for such improvements should be considered, when JICA provides technical supports in the power sector.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs Construction of transmission lines	Construction of double circuits of 115 kV transmission lines from Pakxan through Thakhek to Pakbo (about 300km, ACSR)	Construction of double circuits of 115 kV transmission lines from Pakxan through Thakhek to Pakbo (284km, TACSR)
Extension of 115/22kV substations	Construction of 115kV outdoor transmission feeder bays, installation of protective relay system, extensions of communication and SCADA system at Pakxan substation, Thakhek substation and Pakbo substations	Construction of 115kV outdoor transmission feeder bays, installation of protective relay system, extensions of communication and SCADA system at Pakxan substation, Thakhek substation and Pakbo substations
Consulting services	Design work, procurement assistance, construction supervision, etc.	Design work, procurement assistance, construction supervision, etc.
2.Project Period	March 2005-November 2008 (45 months)	March 2005-April 2011 (74 months)
3.Project Cost Amount paid in foreign currency Amount paid in local currency Total Japanese ODA loan portion Exchange rate	3,326 million yen 588 million yen (56,507 million LAK) 3,914 million yen 3,326 million yen 1LAK=0.01041 yen (as of October 2004)	3,326 million yen 461 million yen (40,513 million LAK) 3,787 million yen 3,326 million yen 1LAK＝0.01138 yen (average between March 2005 and April 2011)

Kingdom of Thailand

Ex-Post Evaluation of Japanese ODA Loan Project

"Transmission System and Substation Development Project (Sixth Stage Phase I)"

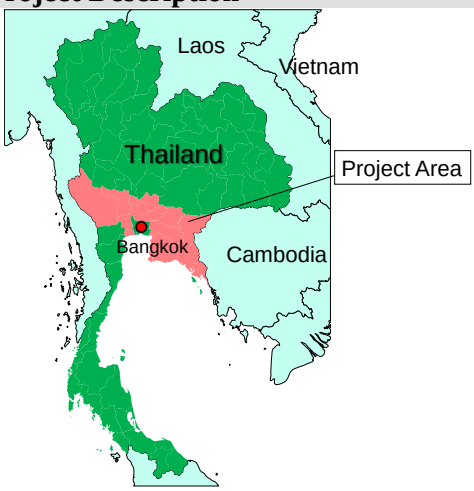
External Evaluator: Keisuke Nishikawa, Japan Economic Research Institute Inc.

0. Summary

This project was implemented to construct substations and extend transmission lines to meet the growing demand for electricity and to stabilize electricity supply in the central region of Thailand. The relevance of this project is high as this project has been consistent with the development plan and needs of Thailand both at the times of appraisal and ex-post evaluation as well as Japan's ODA policy at the time of appraisal. With regard to project effectiveness, it is considered that the effects have sufficiently been observed, as there are no concerns regarding the utilization factor and the voltage drop, outages have improved and the level of user satisfaction is generally high. Positive impacts were observed in terms of stable response to increasing electricity demand, which promoted vibrant economic activities and business establishment; therefore, the effectiveness and impact is also high. In terms of project implementation, the efficiency of the project is fair as the project period was significantly longer than the plan while the project cost was within the plan. With regard to operation and maintenance, no problems have been observed in the institutional, technical, and financial aspects, and the operation and maintenance conditions of the facilities were also favorable. Therefore, it was judged that the sustainability of the generated effects was high.

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

1. Project Description



Project Location

Sub-station constructed under this project
(Nakhon Pathom Province)

1.1 Background

Along with the social and economic development in the first half of 1990s, energy demand in Thailand increased at an annual average of 9.2% during the five-year period between 1992 and 1996. In 1996, the peak power demand in the whole area of Thailand reached 13,905MW, out of which the peak demand of the area covered by the Provincial Electricity Authority (hereinafter referred to as PEA) being 8,268MW. Under the economic conditions of the time, the rate of demand increase was expected to slow, but a stable supply of electricity as well as the improvement in the reliability of transmission networks remained highly important. Moreover, as a consequence of rapid economic growth, regional disparities were expanding, prompting the Government of Thailand to place 'regional development' as one of the priority areas in its national development plan. In response to these circumstances, it was deemed essential to achieve a stable electricity supply and improve the quality of electricity in regions outside the Bangkok metropolitan region so that the development of regional economies through decentralization of industries would be supported.

1.2 Project Outline

The objective of the project was to meet increasing electricity demands, particularly those of middle and large scale industries, and improve the reliability of the electricity supply by constructing new substations and expanding transmission lines in the 16 provinces around Bangkok, thereby contributing to the development of regional economies.

Loan Approved Amount / Disbursed Amount	15,518 million yen / 8,172 million yen
Exchange of Notes Date / Loan Agreement Signing Date	September, 1997 / September, 1997
Terms and Conditions	Interest Rate: 2.70% Repayment Period: 25 years (Grace Period: 7 years) Conditions for procurement: General Untied
Borrower / Executing Agency	Provincial Electricity Authority / Provincial Electricity Authority
Final Disbursement Date	January, 2006
Feasibility Studies, etc.	'The Eighth Transmission and Distribution Development Plan (1997-2001)' (Prepared by the Executing Agency in February, 1997)

Related Projects	[ODA Loan] Transmission System and Substation Development Project ・ First Stage, Phase 1 (L/A signed in 1991) ・ Fourth Stage (L/A signed in 1993) ・ Fifth Stage (L/A signed in 1995) ・ Seventh Stage, Phase 2 (L/A signed in 2002)

2. Outline of the Evaluation Study

2.1 External Evaluator

Keisuke Nishikawa, Japan Economic Research Institute Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: August 2013 - January 2015

Duration of the Field Study: September 3 - 18, 2014 and November 23 - 29, 2014

2.3 Constraints during the Evaluation Study

As stated below, a substantial delay occurred in this project and the last substation was still being constructed at the time of ex-post evaluation. Therefore, the project period was calculated with September 2014, when the first field study was conducted, as the point of completion.

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

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance to the Development Plan of Thailand

At the time of appraisal of this project, development was underway based on the 8th National Economic and Social Development Plan (1997-2001) in Thailand, which focused on the people-centered development in which human potentials would be nurtured and developed, and the promotion of stable and sustainable economic growth would be its central agenda. Based on the 8th National Economic and Social Development Plan, PEA formulated five plans and eleven projects in its own development plan. This project comprises part of the 'transmission network development plan', which is one of five plans. In the energy policy formulated by the National Energy Policy Office at that time, one of the strategies was to respond to growing electricity demand and improve

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

[2] ③: High, ②: Fair, ①: Low

supply reliability and service levels.

In the 11th National Economic and Social Development Plan (2012-2016), a national-level development plan of Thailand at the time of ex-post evaluation, there are development strategies such as 'strengthening the agricultural sector, food and energy security' and 'restructuring the economy toward quality growth and sustainability'. As at the time of appraisal, PEA formulated the Power System Development Plan (PSDP) in accordance with this National Economic and Social Development Plan. In PEA's 11th PSDP (2012-2016), nine objectives are set, such as an improvement in the quality, reliability and safety of the power network, and electrification with quality by responding to demand. Concretely, there are five plans listed as priority plans, under which there are 14 projects, such as further stabilization of transmission and distribution networks, as well as the development of a smart grid.

In the Power Development Plan (PDP) 2012-2030, prepared by the Ministry of Energy, priorities are given to the sustenance of power system safety as well as adequate and reliable electricity supply. With regard to electricity generation, it is planned that the generation capacity of 32,395MW as of 2011 will be increased to 70,686MW in 2030. In the plan, the share of renewable energy is targeted to be higher.

As shown above, the National Economic and Social Development Plan listed the need to secure energy at all times, both at the time of appraisal and ex-post evaluation, indicating that electricity supply has always been important in the policy. Also, PEA's PSDP has been formulated in line with the national plan, showing a consistent policy to expand transmission and distribution networks. In PDP, the importance of supplying increasing electricity in a stable manner is also stated.

In light of the above, it can be said that this project has been highly consistent with Thailand's development plan and the electricity sector plan at the time of planning and ex-post evaluation.

3.1.2 Relevance to the Development Needs of Thailand

In the 1990s, a period of appraisal of this project, power demand in the whole of Thailand was rapidly increasing, as recorded in the annual average growth of 9.2% during the five years between 1992 and 1996. It was projected that the demand would keep increasing at an average just shy of 9% from the second half of the 1990s. The rapid growth in demand for electricity was not only seen in the capital area but also in PEA's service areas[3], where the peak demand reached approximately 8,268MW. Based on the

[3] PEA assumes electricity supply in the areas outside Bangkok Metropolitan Region, managed by Metropolitan Electricity Authority.

growth, peak electricity demand was estimated to increase to 10,424MW in 1998 and 15,268MW in 2002.

In addition to these demand increases, promotion of regional economies through decentralization of industries was also a crucial development challenge in the policy of those days, and it was important to achieve a stable electricity supply and improve the electricity quality to indirectly support the promotion of regional economies.

The actual peak demand in the PEA service area from 2006 is as shown in Table 1.

Table 1: Maximum Electricity Demand (Peak Demand) in PEA's Service Area

Year	Peak Demand (MW)	Increase over the Previous Year (%)
2006	13,074	4.11
2007	13,758	5.23
2008	14,309	4.01
2009	14,745	3.05
2010	16,226	10.04
2011	16,223	-0.02
2012	16,952	4.50
2013	17,832	5.19
2014	18,821	5.54

Source: Data provided by the Executing Agency

Note: Actual values for 2006-2012, Estimated values for 2013-2014

The peak demand has been steadily growing except 2011, when large-scale flooding damage occurred in the central area of Thailand, showing an annual growth average of 4.42% between 2006 and 2012. 85% of the electricity consumption is for industrial purposes, indicating that the demand for electricity by industries has always been high.

On the other hand, regarding stable electricity supply and improvement in electricity quality, Table 2 shows outage hours and the number of outages per user.

Table 2: Outage Hours and the Number of Outages per User (Annual)

Year	Outage Hours (minutes)			Number of Outage		
	National	Central	Metropolitan	National	Central	Metropolitan
1997	1,558	702	—	19.6	13.0	—
2000	1,188	623	—	18.1	10.9	—
2005	630	377	—	12.0	10.2	—
2009	386	214	47	9.6	7.3	1.9
2010	350	203	47	8.9	6.8	1.7
2011	319	179	59	8.4	6.3	1.8
2012	281	179	49	7.8	6.2	1.8
2013	249	165	47	7.2	5.7	1.7

Source: Data provided by the Executing Agency
Note: 'National' in the table shows PEA's electricity supply area. 'Central' is identical with the 16 provinces covered in this project.

It can be observed from Table 2 that the outage hours and the number of outages in the project area (16 provinces in the Central Area) have significantly improved since 1997- the time of appraisal. However, a total of 165 minutes and 5.9 outages occurred in 2013, 3-4 times higher than the metropolitan region.

As shown above, electricity demand in recent years has kept increasing while the rate is slower than in 1990s, demonstrating continued needs of securing and enhancing electricity supply capacities. With regard to stable electricity supply, despite substantial improvement in recent years compared to the past, outages in the Central Region have been occurring more frequently and for longer periods in comparison with the metropolitan region, not only at the time of appraisal but also at the time of ex-post evaluation, which indicate high needs of electricity supply enhancement and stabilization. This project can be said to have been implemented in light of such development needs.

3.1.3 Relevance to Japan's ODA Policy

As the appraisal document of this project had no mention of the consistency of the project with Japan's ODA policy, the ODA Charter formulated in 1992 was regarded as the ODA policy at the time of appraisal, and the consistency of the project was checked against the Charter.

In the old ODA Charter approved in 1992, infrastructure development was listed as a priority area, and assistance to infrastructure development, a fundamental condition essential to economic and social development, was deemed important. In addition, considerations to redressing the gap between regions were set as the measures for the effective implementation of ODA. Therefore, this project, which developed infrastructure

facilities in rural areas, can be judged to have been consistent with Japan' ODA policy at that time.

Based on the above, it can be said that this project has been consistent with the national and sector plans which aimed to transform the economy to one of high-quality with sustainable growth, and to supply electricity in a stable manner, both at the time of appraisal and ex-post evaluation. Despite some year-to-year fluctuations, electricity demand has shown significant increases over the long-term. Also, the outage hours and the number of outages in the Central Region, the target area of this project, have remained longer and more frequent than the metropolitan region, despite improvements. This suggests the need to develop electricity infrastructure to achieve a stable supply of electricity with better quality, indicating the necessity of this project both at the time of appraisal and ex-post evaluation. Concerning the consistency with Japan's policy, this project is consistent with the priority area of the ODA Charter at that time as it supported the development of economic and social infrastructure in the rural area.

In light of the above, the relevance of this project is high.

3.2 Effectiveness[4] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

Since no indicators to measure project effectiveness, base values, or target values had been set at the time of appraisal of this project, this evaluation study was designed to capture as many indicators set in other related projects as well as basic and auxiliary operation and effect indicators for transmission projects, such as the utilization factor (substations), voltage drop rate, number of outages, outage hours and the volume of electricity supply by province in the project area.

As PEA had a policy to keep the utilization factor of substations below 75% and voltage drop normally under 5%, these indicators were used as target values in this project. The utilization factor of the 43 substations developed by the time of ex-post evaluation was between 25% and 97% (2013), and eight out of 43 substations exceeded the reference value of 75% (2013). However, as 35 substations were below reference and the highest average rate was 55.1% (2012), this criterion can be said to have been generally achieved. According to PEA, when the utilization factor of a certain substation constantly exceeds 75%, other substations are used or a new substation is constructed if at all possible.

[4] Sub-rating for Effectiveness is to be put with consideration of Impact.

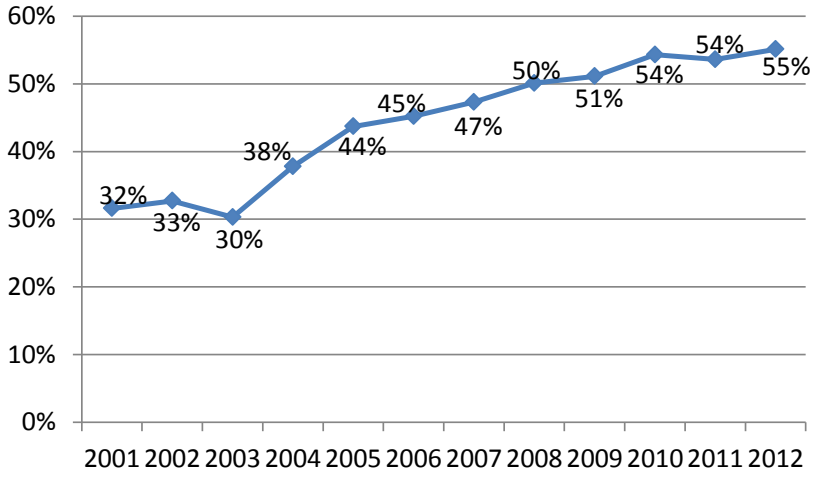


Figure 1: Average Utilization Factor of Substations Developed in this Project

Source: Prepared based on the data provided by the Executing Agency

With regard to the voltage drop, only up to 5% is allowed at PEA under normal operating conditions of 115kV transmission lines and 33kV/22kV distribution lines. When it exceeds the limit, measures are taken by increasing capacitors (condensers). In the project area, no provinces have recorded the voltage drop of more than 5% since 2009, when such data is traceable. Table 3 shows the rate of each province in 2013.

Table 3: Main Operation and Effect Indicators of this Project (2013)

Province	Voltage Drop (%)	Outage Hours (minutes/year)	Outage Times (times/year)	Electricity Supply (GWh)
Ayutthaya	2.65	212.3	6.7	5,194
Ang Thong	3.51	115.6	4.3	1,004
Saraburi	4.35	192.8	6.1	7,332
Pathum Thani	3.91	114.02	4.3	7,846
Nakhon Nayok	4.35	182.7	8.3	539
Prachin Buri	4.76	192.1	6.2	2,109
Sakaeo	4.35	221.1	6.8	630
Chachoeng Sao	3.89	149.0	4.6	4,118
Chon Buri	3.14	99.5	4.7	10,880
Rayong	3.44	166.0	5.7	9,350
Chantha Buri	3.71	349.7	9.8	1,486
Trat	4.39	514.5	15.3	609
Nakhon Pathom	0.97	81.2	3.9	4,664
Samutsakhon	1.21	77.0	3.3	6,731
Suphan Buri	1.39	160.0	6.8	1,419
Kanchana Buri	1.08	220.7	5.9	1,309

Source: Data Provided by the Executing Agency

Table 3 shows some fundamental operation indicators such as outage hours, number of outages and the volume of electricity supply, in addition to the voltage drop rate. Outage hours and the number of outages have decreased to approximately half of 2005, when such data exists, and the volume of electricity supply in 2013 increased by 44% from 2005. It can be said that sufficient and stable electricity supply has been underpinned through implementation of this project.

This project was implemented to develop transmission lines to respond to increasing electricity demand. At the time of ex-post evaluation, the enhancement of substation equipment capacities was 3,550MW through the implementation of this project (excluding one uncompleted substation). Once the last substation is completed, the supply capacity will be increased by another 100MW. As the installed capacity of substations in the Central Area is 13,330MW, this project would constitute 27% of the entire substation installed capacity, once the whole project is completed. It can be said that this project contributed to the realization of capacity enhancement and stable supply to respond to the growing demand.

3.2.2 Qualitative Effects

As a qualitative effect of this project, an improvement of customer satisfaction through improved electricity supply capacities and the realization of stable supply was expected. In order to verify this expectation, an interview survey was conducted with a total of 16 large users and the chambers of commerce and industry (commerce and manufacturing) in the four provinces of Chon Buri, Rayong, Nakhon Pathom, and Ayutthaya, all of which were in the project area.

As a result, all interviewees responded that power outages decreased dramatically compared to the past and the outage hours became shorter while they sometimes occur even at the time of ex-post evaluation. It was also heard from the interviews that while voltage fluctuations had not been a major problem and electricity supply had never been suspended on a large scale, the supply became much more stable in recent years compared to the past, confirming that the interviewees were satisfied with the electricity supply as a whole. While some of the manufacturing firms requested further improvement stating that an installation of their own backup generator was required since even a momentary blackout would affect their operations, all the interviewees commented that the electricity supply was more stable than in neighboring countries, indicating a higher level of satisfaction. Among the interviewees, two were Japanese firms located in an industrial park, and it was heard from them that stable supply of electricity and water was a big factor for their decisions for investment.

3.3 Impact

3.3.1 Intended Impacts

The impacts of this project expected at the time of appraisal was the promotion of regional industry and economy through improved electricity supply capacities and supply reliability, and the employment generation and the improvement of living standards associated with it.

While it is difficult to verify direct causal relationships between these macro-level changes and the electricity supply as the changes are not brought about by the improved electricity supply alone, provincial economic data (average annual growth rate) and the rate of increase in electricity demand of the target provinces were obtained to see the expectations.

Table 4 shows the annual real economic growth rates (Gross Provincial Product: GPP) of each province, classified by agricultural and non-agricultural sectors for 1997 - 2012.

Table 4: Real Economic Growth Rate (GPP) of Each Province in the Project Area

	Real GPP Average Annual Growth Rate (1997-2012)			Ratio of Non-Agricultural Sector in GPP (2012)
	Real GPP	Agriculture	Non-Agriculture	
Ayutthaya	4.15%	2.41%	4.19%	98.2%
Ang Thong	1.72%	1.66%	1.84%	88.9%
Saraburi	3.95%	5.22%	3.88%	95.8%
Pathum Thani	0.87%	1.72%	0.87%	98.9%
Nakhon Nayok	3.86%	4.54%	3.49%	73.5%
Prachin Buri	9.07%	2.28%	9.33%	97.7%
Sakaeo	3.40%	2.21%	3.86%	78.2%
Chachoeng Sao	6.70%	1.81%	7.05%	95.9%
Chon Buri	4.40%	2.67%	4.43%	97.4%
Rayong	4.71%	2.02%	4.81%	96.8%
Chantha Buri	2.16%	1.22%	2.99%	52.3%
Trat	2.43%	2.54%	2.14%	45.3%
Nakhon Pathom	3.22%	2.57%	3.27%	93.2%
Samutsakhon	3.62%	9.25%	3.31%	92.0%
Suphan Buri	2.13%	1.93%	2.30%	75.2%
Kanchana Buri	1.39%	3.66%	0.95%	81.2%
All 16 Provinces	4.01%	2.88%	4.09%	94.0%

Source: Calculated from the Gross Regional and Provincial Product, published by the National Economic and Social Development Board

Table 5 shows the average annual electricity demand growth rate of each province for 2003 – 2012.

Table 5: Average Annual Growth Rate of Electricity Demand of Each Province

	Electricity Demand by Province Annual Average Growth Rate (2003 – 2012)		
	Household	Industrial	Total
Ayutthaya	5.27%	2.89%	3.16%
Ang Thong	4.24%	5.30%	4.86%
Saraburi	5.51%	3.25%	3.45%
Pathum Thani	7.13%	1.06%	2.04%
Nakhon Nayok	5.22%	6.82%	6.19%
Prachin Buri	5.09%	8.89%	8.25%
Sakaeo	5.52%	11.91%	8.96%
Chachoeng Sao	5.73%	8.04%	7.75%
Chon Buri	7.57%	8.55%	8.36%
Rayong	7.07%	4.60%	4.79%
Chantha Buri	4.06%	10.80%	7.24%
Trat	4.72%	10.55%	7.77%
Nakhon Pathom	5.70%	4.64%	4.83%
Samutsakhon	5.27%	4.34%	4.41%
Suphan Buri	5.40%	8.37%	6.92%
Kanchana Buri	5.83%	3.27%	3.80%
All 16 Provinces	6.10%	4.83%	5.02%

Source: Calculated from the Data Provided by the Executing Agency

As indicated in Table 4, economic growth rates of the 16 provinces over 15 years from the time of project appraisal (1997) till 2012 recorded an annual average of 4.0% as a whole with the growth of the non-agricultural sector which comprises 94% of GPP (2012). While it is difficult to measure the extent to which this project contributed to this growth, it assumes 27% of the entire installed capacities of substations as described above, and it is presumed that the project has made a certain degree of contribution.

The electricity demand of general households and industries in the entire project area (Table 5) increased by an annual average of 6.10% and 4.83% respectively between 2003 and 2012, when the data were available, making the total average of 5.02%. It can be observed that the electricity demand has increased with economic growth.

As briefly stated in '3.2.2 Qualitative Effects', it was uniformly heard in the interviews with large electricity users and chamber of commerce and industry that stable electricity supply was an indispensable factor for manufacturing and commercial activities, and that the increase in the establishment of firms over the last 15 years was led by the secure supply in the project area. Moreover, it was heard from large electricity users and chamber of commerce and industry in each province visited that sufficient and stable electricity supply promoted 'employment generation → income improvement → increase in consumption → economic growth' through smooth economic activities and new establishment of firms. It is considered that this project was one of the contributing factors.

Based on the above, 'the promotion of regional industry and economy through

improved electricity supply capacities and supply reliability, and the employment generation and the improvement of living standards associated with it', expected at the time of appraisal, can be evaluated to have been realized to substantial extent.

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

At the time of appraisal, no particular negative environmental impact was estimated as this was a project to construct a small-scale transmission network. According to the environmental law of Thailand, it was confirmed that no environmental impact assessment would be required.

According to the executing agency, no negative impact on natural environment during or after the construction has been observed, and no reports or news on any particular environmental problems were identified. Therefore, it is considered that there were no negative impacts on the natural environment.

3.3.2.2 Land Acquisition and Resettlement

When a section of land for substations is going to be secured, PEA has adopted a method to 'determine the site for substations → implement a tender process to accept applications (bidding) from land owners → sign a purchase agreement'. Therefore, it was expected during the planning that the process could take much time in some cases. However, this project was said to have already been in the process of bidding by land owners at the time of appraisal and the sites were basically selected in the area with abundant supply of land, and it was reported that no change of sites or of the scope of substations had been required in the past due to problems with land purchases.

A land area of 384,000m^2 was scheduled to be purchased in the initial plan for the construction of substations, but 568,400m^2 was actually purchased. The main reason for this change is that the land owners of the candidate sites were often reluctant to sell the area of land PEA needed, for the reason that the remaining piece of land after it is divided would not be utilized. As a result, PEA purchased a larger area of land. Also, there were some sections of land whose market prices were actually higher than the purchase prices planned based on the values assessed by the Land Development Department, which required securing more finances causing delays in purchasing the land that led to the delay of the project. However, according to PEA, no issues occurred regarding land acquisition in this project as the purchases were made based on the market prices with consents from land owners.

With regard to transmission lines, as they were constructed along the existing roads, no land acquisition took place.

No resettlement of residents was observed for the construction of substations and transmission lines, according to PEA, and it is assumed that there were no problems.

While no indicators to measure the project effects had been set at the time of appraisal of this project, there were no concerns on the utilization factor and the voltage drop, fundamental indicators of a transmission project. Power outage situations improved and customer satisfaction levels were also generally high. Therefore, it can be judged that the effects of this project have been sufficiently achieved.

Impacts were observed in that stable economic activities evolved and the establishment of firms was promoted as this project underpinned steady economic growth and the increase in electricity demand in the project area. No negative impacts on the natural environment were observed, and the purchases of land were implemented based on market prices under the consents from landowners. It can be judged to have no problems in this regard.

In light of the above, the effectiveness and impact of this project is high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

Table 6 compares the original and actual outputs of this project.

Table 6: Comparison of Original and Actual Project Outputs

	Original	Actual
Project Area	16 provinces around Bangkok	16 provinces around Bangkok
Construction of 115kV Transmission Line	39 sections, 780cct-km	43 sections, 731.1cct-km
Construction of 115kV-22kV Substations	44 locations, Total transformer capacity : 3,500MVA	43 locations, Total transformer capacity : 3,550MVA
Construction of 115kV Switching Station	1 location	1 location

Source: Project Appraisal Document, Information provided by the Executing Agency
Note: The last substation (in Nakhon Pathom) was being constructed at the time of ex-post evaluation, and it was scheduled to be completed during the first quarter of 2015.

As indicated in Table 6, this project, a project in which a number of substations and transmission lines were going to be constructed, was generally implemented as planned. Due to the change of project sites of some substations, the number of transmission lines increased and their distance decreased. However, it is assumed that there were no problems as these changes did not seem to have affected the generation of project effects.

43 substations had been completed at the time of ex-post evaluation as it took a long time for land acquisition, with the last one uncompleted. While a number of substations had construction delays, there were no cases where the electricity supply volume became short due to these delays and incompletion as the electricity supply was secured by the entire transmission network. It is important to note, however, that the volume of electricity required at that time was supplied by the substations as the construction was gradually completed despite the project delay, since the supply capacity had been designed based on the long-term plan, and there were some years when the demand growth fell below initial expectations due to economically negative factors such as the Asian Economic Crisis, Lehman crisis, and the flooding in 2011.

No external consultants were employed in this project and PEA managed all the project implementation by itself. According to PEA, there were no particular problems observed by not hiring any consultants.

Gas Insulated Transformer


Rojana 2 Substation


Transmission Line Constructed under This Project

3.4.2 Project Inputs

3.4.2.1 Project Cost

The planned project cost was 43,115 million yen (foreign currency portion: 15,518 million yen, local currency portion: 27,597 yen), and the entire foreign currency portion of 15,518 million yen was to be financed through ODA loan.

Table 7 summarizes the original and actual project costs on a comparable basis.

Table 7: Comparison of Original and Actual Project Costs

(Unit: million yen)

Item	Original		Actual	
	Total	ODA loan portion	Total	ODA loan portion
Transmission Line	7,862	2,048	7,417	1,900
Substation	18,508	11,354	17,013	6,272
Land Acquisition	4,047	0	1,725	0
Labor Cost	1,354	0	579	0
Transportation Cost	565	0	18	0
Equipment Cost	1,612	0	365	0
Engineering and Supervision	406	0		0
Price Escalation	3,019	705	0	0
Contingencies	3,920	1,411	2,230	0
Tax	1,822	0	425	0
Total	43,115	15,518	29,772	8,172

Source: Project Appraisal Document, Project Completion Report

Note 1: The original cost was calculated based on 1 baht = 4.75 yen, and the actual cost was calculated based on 1 baht = 2.89 yen, the average between 2001 and 2014, when the local currency portion was spent.

Note 2: The actual project cost includes the cost of the 44th substation being constructed at the time of ex-post evaluation, etc.

While there were few increases or decreases in the project outputs, the government at that time set a policy recommending domestic procurement of materials with the local currency portion, which resulted in a substantial reduction in the disbursement of ODA loan. The project components for the ODA loan portion were completed in 2006, during the project implementation, leading to the end of disbursement. In Table 7, while the local currency portion decreased in yen terms, it was a 29% increase based on Thai baht. As the project cost decreased substantially in yen terms with the exchange rate of stronger Japanese yen, the total project cost ended in 29,772 million yen. Therefore, the total project cost was 69% of the plan, within the planned amount.

3.4.2.2 Project Period

The original and actual periods of this project were as shown in Table 8.

Table 8: Comparison of Original and Actual Project Periods

Original	Actual	Actual / Original
September 1997 – December 2001 (51 months)	September 1997 – September 2014 (204 months)	400%

Note: 'September 2014' in 'Actual' indicates the timing of the first field study.

While the duration of the project initially expected was 51 months, the project was substantially delayed mainly due to the following reasons.

- Expenditures by government organizations were restrained due to the change in the policy after the Asian currency crisis occurred, which led to the stagnation of land acquisition processes. It was gradually started from 1999.
- Permission from the Ministry of Industry was required for government organizations to procure imported goods and it took a long time for these processes.
- Land prices of the project sites often exceeded the values assessed by the Land Development Department, and additional time was required to secure the budget again.
- More time was required to obtain permissions from related organizations such as the Department of Highways and the State Railway of Thailand to construct transmission lines.
- Much time was required for land acquisition particularly for the construction of the last 44th substation.

As a result, the 44th substation was being constructed at the time of ex-post evaluation of this project, and this timing was deemed as the end of the project period in this study. Therefore, the project duration was 204 months, which was 400% of the plan.

Although a substantial delay occurred due to the reasons above, no supply shortage was brought about in the whole electricity network and the electricity was supplied without problems. While significant delay occurred, it was possible to respond to the increases in electricity demand as the facilities were gradually developed. It can be judged that the delay did not cause any negative effects in particular to the generation of project effects.

3.4.2.3 Results of Calculations of Internal Rates of Return (Reference only)

At the time of planning of this project, the Financial Internal Rate of Return (FIRR) based on the entire plan which was based on PEA's eighth plan was calculated to be 15.43%. The FIRR calculated specifically for this project in the ex-post evaluation survey was 18.25%, indicating a sufficient rate of earning.

The outputs of this project were confirmed to be almost the same as the plan though the last substation was still under construction. With regard to the project cost, while the local currency portion virtually increased, the ODA loan portion was significantly reduced with the change of policy of the Thai government to restrain borrowings in foreign currencies.

With this background, the total project cost was within the plan (69% of the plan). The project period was 400% of the plan as substantial delays occurred for land acquisition and the processing within the government organizations.

In light of the above, although the project cost was within the plan, the project period significantly exceeded the plan. Therefore, the efficiency of the project is fair.

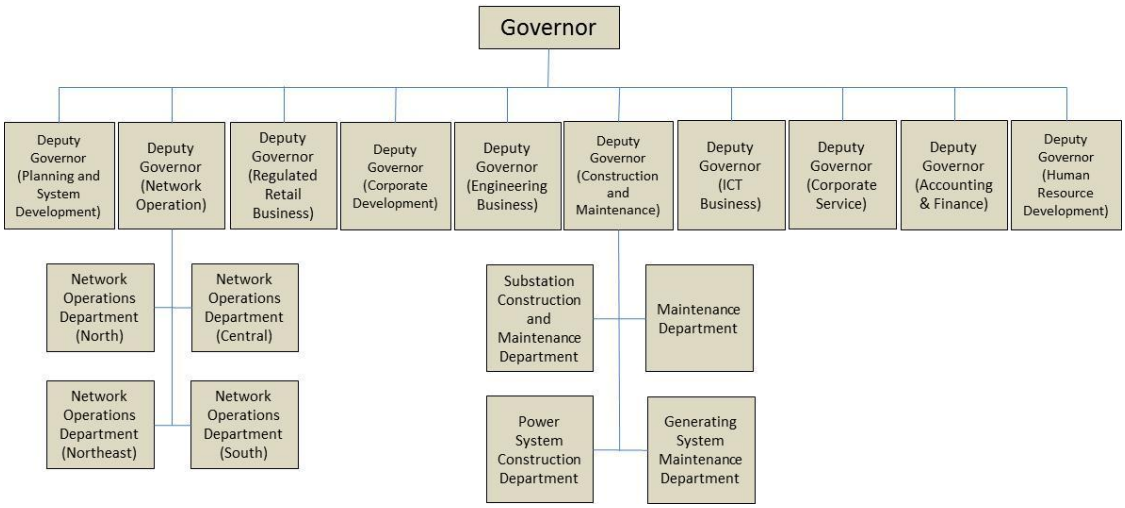
3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

The executing agency of this project is the Provincial Electricity Authority (PEA), as already stated above. PEA is a state-owned enterprise wholly owned by the Thai government, and it is under the supervision of the Ministry of Interior. It undertakes power transmission and distribution in all the regions except for the Bangkok metropolitan region with 915 offices and 28,060 staff members (2012). PEA has four regional offices (North, Northeast, Central and South) under the Deputy Governor in charge of network operations, and these regional offices have three area offices each.

Daily operation and maintenance activities of the transmission lines and substations are implemented by the staff in the Network Operations Department and the Substation Construction and Maintenance Department assigned to each area office (three offices in the area of this project). While 20 - 30 engineers and technicians are stationed at each area office, a maintenance team from a division in charge at the headquarters will be dispatched in the case of major breakdown (Substation Maintenance Division: 50 staff), and attend to the repair together with the area offices.

PEA has been in the process of shifting from a 24-hour manning system to an unmanned system at each substation by remotely supervising the network operation status with the use of an electricity network supervising and controlling system called SCADA.



Source: Information provided by PEA

Figure 2: Organizational Structure of PEA

3.5.2 Technical Aspects of Operation and Maintenance

PEA has set the years of experience and requirements for operation managers and staff in charge regarding the maintenance capacity of substations. Normally, On-the-Job-Training is employed to improve technical capacities through routine maintenance activities, but the Substation Maintenance Division has been implementing a week-long lecture-workshop and training on substation maintenance techniques at a substation for 100 - 150 technicians, in cooperation with the High Voltage Training Center. Also, it was confirmed that PEA had formulated a maintenance manual of facilities. According to them, it has been utilized at training workshops and in actual activities.

In addition to the formulation of the maintenance manual and the periodical implementation of training for capacity development in this way, the substations and transmission lines in the project area have been in operation without any problems as they were repaired when problems arose. Therefore, it is considered that there are no particular issues in terms of the knowledge and skills of PEA technicians on maintenance activities.

3.5.3 Financial Aspects of Operation and Maintenance

Financial conditions of PEA over the last four years have been sound and, as seen in Table 9: Income Statement of PEA, a surplus has consistently been recorded. The gross profit margin has been approximately 10%, the return on asset (ROA) has been 4.0% - 5.3% and the return on equity (ROE) has been 11.5% - 13.8%. The current ratio is also more than one, demonstrating that the financial status has been stable.

Table 9: Income Statement of PEA

(Unit: million baht)

	2009	2010	2011	2012
Sales	288,961	322,662	323,535	385,839
Cost of Sales and Services	255,930	285,783	287,681	347,528
Gross Profit on Sales	33,031	36,879	35,854	38,311
(Gross Profit Rate)	(11.4%)	(11.4%)	(11.1%)	(9.9%)
Sales and Administrative Expenses	17,766	20,229	21,869	22,644
Operating Profit / Loss	15,266	16,650	13,986	15,667
Non-operating Income	1,541	1,049	1,224	2,329
Non-operating Expense	2,807	2,936	3,039	3,234
Current Profit	14,000	14,763	12,171	14,761
Profit for the Year Before Tax	14,000	14,763	12,171	14,761
Net Profit for the Year	14,000	14,763	12,171	14,761

Source: Prepared based on the PEA Annual Report (2009 – 2012)

Table 10: Balance Sheet of PEA

(Unit: million baht)

	2009	2010	2011	2012
Current Asset	56,210	67,865	75,631	66,105
Fixed Asset	205,826	216,132	228,178	243,037
Total Asset	262,037	283,997	303,809	309,142
Current Liability	47,493	49,437	61,553	58,850
Fixed Liability	113,406	126,127	136,176	137,908
Total Liability	160,899	175,565	197,729	196,758
Capital	101,137	108,432	106,080	112,384
Total Capital and Liabilities	262,037	283,997	303,809	309,142

Source: Prepared based on the PEA Annual Report (2009 – 2012)

The maintenance expenditure of the entire PEA has shown that the actual amount normally exceeds the budget as a whole, though the provincial data was not developed, making it impossible to obtain. Costs for repair are not appropriated at the beginning of the financial year and they are recorded afterwards. While sufficient maintenance has generally been conducted, the financial burden is not considered large as the maintenance expenditure has been 0.2% of the revenue from electricity sales and 4.0% - 5.6% of the net profit for the year.

Table 11: Maintenance Expenditure of PEA

(Unit: million baht)

	Maintenance Cost		(A) / Revenue from Electricity Sales	(A) / Net Profit for the Year
	Budget	Actual (A)		
2009	581.1	597.1	0.2%	4.3%
2010	588.0	597.0	0.2%	4.0%
2011	567.0	685.9	0.2%	5.6%
2012	604.0	736.3	0.2%	5.0%

Source: Data provided by PEA, PEA Annual Report

3.5.4 Current Status of Operation and Maintenance

During the ex-post evaluation study, site visits were conducted in the provinces of Chon Buri, Rayong, Nakhon Pathom and Ayutthaya in the project area. All the substations and transmission network developed in this project were never left broken for a long period of time and were operating normally. According to PEA, one switching station installed has been operating without any problems.

With regard to the maintenance plan of these facilities, the maintenance team of the Substation Construction and Maintenance Department at the headquarters has been inspecting each substation in the three areas in the Central region once a year, in addition to the cases of large-scale breakdowns. Moreover, the Network Operations Department of regional offices has been supervising the network with the use of the SCADA system, and the staff of the Department has been implementing monthly visual inspections of transmission lines.

Therefore, the substations and transmission lines developed in this project have been maintained in good condition, and a regular inspection has been systematically implemented, leaving no major concerns on operation and maintenance. It can be said that there are no issues as a whole.

No concerns were observed in terms of the institutional aspects of operation and maintenance, operation and maintenance conditions, and the techniques on inspections and repairs. Financial conditions have always been sound and stable.

In light of the above, no major problems have been observed in the institutional, technical and financial aspects of the operation and maintenance system. Therefore, the sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented to construct substations and extend transmission lines to meet the growing demand for electricity and to stabilize electricity supply in the central region of Thailand. The relevance of this project is high as this project has been consistent with the development plan and needs of Thailand both at the times of appraisal and ex-post evaluation as well as Japan's ODA policy at the time of appraisal. With regard to project effectiveness, it is considered that the effects have sufficiently been observed, as there are no concerns regarding the utilization factor and the voltage drop, outages have improved and the level of user satisfaction is generally high. Positive impacts were observed in terms of stable response to increasing electricity demand, which promoted vibrant economic

activities and business establishment; therefore, the effectiveness and impact is also high. In terms of project implementation, the efficiency of the project is fair as the project period was significantly longer than the plan while the project cost was within the plan. With regard to operation and maintenance, no problems have been observed in the institutional, technical, and financial aspects, and the operation and maintenance conditions of the facilities were also favorable. Therefore, it was judged that the sustainability of the generated effects was 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

4.2.1.1 Construction of Uncompleted Substation

As a result of significant delays in land acquisition for substation construction in this project, the last substation was still being constructed even at the time of ex-post evaluation, 17 years after the loan agreement was signed. While the entire supply has been secured by power interchanges from other substations in the transmission network, it is important to implement the construction of the last substation in line with the schedule without any further delay and start operations at an early date so that an optimal transmission network will be established and burdens on existing substations will be reduced.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

4.3.1 Improvements in the Project Site Decision Process

The project was delayed due to the change in the government policy to restrict the purchase of imported goods and restrain expenditure due to the occurrence of the Asian currency crisis soon after the loan agreement of this project was signed. Furthermore, as the project was commenced without decisions on the land sections for substations, there were problems observed in terms of the long time required for site selection and the escalation of land prices during that period causing budget shortage to purchase the land.

Despite substantial delays, electricity was supplied to users smoothly in this project through existing substations in the transmission and distribution network, and there were no significant issues. However, in a future transmission and distribution project with the construction of many substations, it is considered that candidate sites need to be pre-selected to the extent possible, as in the efforts currently made by PEA, so that the

project period falls within the plan, leading to the prompt generation of project effects.

(End)

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	1) Construction of 115kV Transmission Line (39 circuits, 780cct-km) 2) Construction of 115kV-22kV Substations (44 stations, with a total installed capacity of 3,500MVA) 3) Construction of a 115kV switching station (1 station)	1) Construction of 115kV Transmission Line (43 circuits, 731.1cct-km) 2) Construction of 115kV-22kV Substations (44 stations, with a total installed capacity of 3,650MVA) 3) Construction of a 115kV switching station (1 station)
2. Project Period	September 1997 - December 2001 (51 months)	September 1997 - September 2014 (204 months)
3. Project Cost Amount paid in foreign currency Amount paid in local currency Total Japanese ODA loan portion Exchange rate	15,518 million yen 27,597 million yen 43,115 million yen 15,518 million yen 1 Baht = 4.75 yen (As of September 1997)	8,172 million yen 21,600 million yen 29,772 million yen 8,172 million yen 1 Baht = 2.89 yen (Average between 2001 -2014, when the local currency was disbursed)

Malaysia

Ex-Post Evaluation of Japanese ODA Loan Project

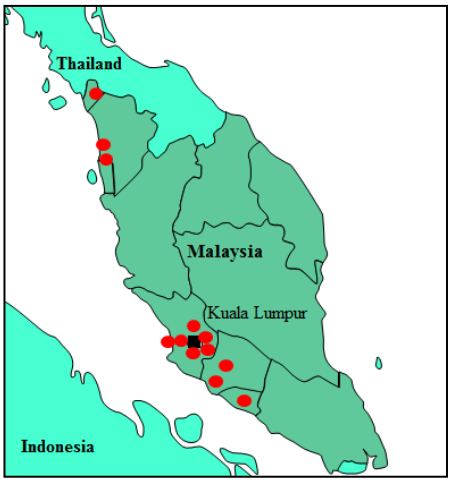
"Sewerage Treatment Plant Project"

External Evaluator: Hisae Takahashi, Ernst & Young Sustainability Co., Ltd.

0. Summary

This project was conducted to improve water quality by developing 13 large-scale sewerage treatment plants, as the first project of its kind in Malaysia and helping improve public sanitation conditions. The project is consistent with Malaysian development policy and needs, both of which have prioritized the sewerage sector, and aligned with Japanese assistance policy to Malaysia, thus the relevance is high. In addition, the quality of outflow at target plants was drastically improved by developing sewerage treatment plants under this project and the percentage of population served also achieved the target number. Thanks to constructing large-scale treatment plants, demolition of small treatments plants nearby the target plants and a reduction in their operation cost were confirmed as impacts of the project. Furthermore, under circumstances where the project implementation system on the Malaysian side was not well matured, since this was the first project to construct large-scale sewerage treatment facilities in Malaysia, cases of lessons learned by the executing agency were confirmed. This involved introducing a Charter to fix the period for the sewerage project. Due to the delays in the bidding process and additional construction work, both project cost and period were significantly higher than planned, thus the project efficiency is low. In terms of the sustainability, current operation and maintenance conditions are positive, but the concerns remain over the financial capacity because of insufficient service charges and chronic deficit of the O&M institute. In the light of the above, the project is evaluated to be partially satisfactory.

1. Project Description



Project Locations

(● = Locations of Target Sites)

Damansara Sewerage Treatment Plant

1.1 Background

At the time of project appraisal, the volume of living drainage soared due to rapid development and population growth in urban area of Malaysia. Accordingly, environment sanitation problems were worsening and immediate improvement was required. At the time, while the water supply penetration exceeded 90%, the provision of sewerage services was far behind. Under these circumstances, Sewerage Services Act (SSA) was institutionalized in 1993, followed by privatization of the operation and maintenance department and establishment of a regulatory agency in 1994 to improve and develop a sewerage system. Although this involved serious development of sewerage and septic tank facilities, etc., the sewerage sector remained in an unsatisfactory condition.

Under the above circumstances, the government of Malaysia, aware of the need to improve hygiene and living standards for economic development, announced a policy to promote and strongly boost these issues. To make progress however, despite the urgent need to construct and improve sewerage facilities to meet the drastic population growth, the economic situation of Malaysia, affected by the Asian currency crisis, compounded its difficulties. Accordingly, the government of Malaysia requested assistance from the government of Japan to develop sewerage facilities[1] and it was decided to construct large-scale Sewerage Treatment Plants (STP) and Central Sludge Treatment Facilities (CSTF) as a national first in 14 urban cities of Malaysia.

1.2 Project Outline

The objective of this project is to improve the water quality by developing STP, CSTF, sewer pipelines and pumping stations, etc. at 14 sites, thereby contributing to improve public sanitation conditions and to preserve natural environment in Malaysia.

Loan Approved Amount/ Disbursed Amount	48,489 million yen / 48,258 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2000 / March 2000
Terms and Conditions	Interest Rate 0.75% Repayment Period 40 year (Grace Period) (10 year) Conditions for Procurement: General untied
Borrower / Executing Agency	Malaysia / Sewerage Service Department (SSD), Ministry of Energy, Water and Communication

[1] "Sewerage facilities" here indicates Sewerage Treatment Plants (STP), Central Sludge Treatment Facilities (CSTF), sewer pipelines, pumping stations, etc.

Final Disbursement Date	July 2011
Main Contractor	Shimizu Corporation (Japan) / Hitachi Plant Engineering & Construction (Japan)/Road Builder Sdn. Bhd.(Malaysia)(JV), Taisei Corporation (Japan)/Kubota Corporation (Japan)(JV), Nishihara Environment Technology(Japan)/Kajima Corporation (Japan)/ Ebara Corporation (Japan)(JV)
Main Consultant	Nippon Jogesuido Sekkei(Japan)/ Erinco Sdn.Bhd.(Malaysia)/ Engineering and Environmental Consultants Sdn.Bhd.(Malaysia)(JV)
Feasibility Studies, etc.	"Special Assistance for Project Formulation (SAPROF) for Sewerage Treatment Plant Project" JICA 1998-1999
Related Projects	(Technical Cooperation) ・Individual experts (Sewerage sector-related: dispatched three times between 2000 and 2002 to SSD as Counter Part)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Ernst & Young Sustainability Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: August, 2013 – August, 2014

Duration of the Field Study: October 20 – November 6, 2013, March 13 – 21, 2014

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance to the Development Plan of Malaysia

The development plan of Malaysia at the time of project appraisal, "7th Development Plan (1996-2000)" described the development of sewerage facilities as an important component, given the crucial need to improve the living environment on a national level. In this plan, fifteen times more funding was allocated to the sewerage sector compared to the 6th Development Plan, underlining its importance. The development policy at the time of the ex-post evaluation, the "10th Malaysian Development Plan (2011-2015)", highlighted an infrastructure development plan and 12 priority areas. One of the latter included attempts to improve the living environment. In the water supply and sewerage sector, more efficient operating and managing services as well as providing appropriate sewerage facilities were

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

prioritized. In addition, the Greater Kuala Lumpur (KL) / Klan Valley Plan[4] (2010), which aims to make areas of Kuala Lumpur and the Klan Valley into an international city by 2020, also has prioritized environmental improvement as one of the factors to create attractive urban cities. The plan also clearly mentioned that efforts would be made to improve sewerage water treatment and help enhance water quality in rivers.

At the time of appraisal, SSA 1993[5] was enacted; targeting further development and expansion of sewerage. Subsequently, the Water Services Industry Act 2006 (WSIA 2006) was enforced and both water supply and sewerage services were unified under the Malaysian government. Under this act, operations of sewerage services were opened by concession methods, and the National Water Services Commission (SPAN), a supervisory, surveillance and controlling institution, was established and promoted efforts to ensure efficient water supply and sewerage services and accelerate their development.

As stated above, the development of sewerage facilities has been prioritized as a means of boosting the living environment in Malaysia, from the time of appraisal up to the ex-post evaluation; hence the project is consistent with the policy and plans.

3.1.2 Relevance to the Development Needs of Malaysia

At the time of appraisal, the coverage of the sewerage service system showed a significant delay compared to the water supply system, with penetration exceeding 90%. For example, while the penetration rate of septic tanks[6] increased to 37.3% in 1990 compared to 17.2% in 1970, the increase for sewerage remained minimal, from 3.4 to 5.0%. Conversely, amid rapid economic and population growth, the volume of living sewerage soared and the water environment deteriorated dramatically in large urban areas, whereupon immediate action to improve the sewerage system was required. As of the ex-post evaluation, the penetration ratio of sewerage system increased to 66.6% by 2012, but must reach a minimum of 73% by 2020 with population growth in major urban cities and 223 sewerage plants must be constructed in the region by 2040[7] to maintain their living environment.

Accordingly, developing a sewerage system has been consistently cited as an important issue from the time of appraisal till the ex-post evaluation, meaning the need remains

[4] The Greater KL and Klan Valley Plan is one of 12 national major priority areas specified in the 10th Malaysian Development Plan. It aims to make KL one of the top 20 most livable cities in the world (decided by accessibility, business environment, appeal of tourism, recreation and other services) by expanding its role by 2020 and making KL into an international commercial and financial center.

[5] By installing SSA1993, the sewerage service was privatized with a concession contract, and the Sewerage Service Department (SSD) was established as a supervisory agency.

[6] The term 'Septic Tanks' here includes individual and communal septic tanks.

[7] The result of a survey which SSD commissioned a private research firm to perform. This survey result was not included in any policy documents but was utilized by SSD as a significant source of information to analyze needs, according to the SSD staff.

high.

3.1.3 Relevance to Japan's ODA Policy

The Country Assistance Policy for Malaysia at the time of appraisal prioritized 1) environment conservation, 2) poverty reduction, and 3) development of human resources and small and medium sized enterprises. Among these three, 1) environment conservation focused on improving and developing the urban environment, which was deteriorating due to rapid economic growth, and included developing a sewerage system among its issues[8]. The project supported the construction of sewerage facilities in 13 urban cities and was thus consistent with Japan's ODA policy.

As described above, the project has been highly relevant to the Malaysia's development plan, development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Effectiveness[9] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

At the time of appraisal, improving the percentage of population served[10] in the area operated and maintained by Indah Water Konsortium[11] as well as BOD[12] concentration, which shows water quality, were expected as indicators to show the effect of implementing the project. In addition to these planned effectiveness indicators, SS[13] concentration and the connection rate to STP, which were additionally collected, were captured and utilized as information to analyze the situation as of the ex-post evaluation.

(1) Percentage of Population Served Operated and Maintained by IWK

The percentage of the population served increased from 38.8% at the time of appraisal to 68.8% as of ex-post evaluation, which exceeded the planned target of 51%

[8] Annual report on the implementation status of Official Development Assistance of Japanese Government in 1999

[9] Sub-rating for Effectiveness is to be put with consideration of Impact.

[10] The coverage of sewerage facilities in Malaysia is shown in terms of the population with access to sewerage facilities under the IWK operation (PE) / the total population of the area where IWK manage sewerage services (PE) * 100. Refer to footnote 15 for details of PE (Population Equivalent).

[11] Operation and maintenance of the whole sewerage system for the Malaysian peninsula, except those for Kelantan, Sabah and Sarawak provinces, which were delegated to IWK as the national sewerage operating and maintenance company.

[12] BOD stands for Biochemical Oxygen Demand. BOD concentration is an indicator used to evaluate the proper operation of plants. It shows the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material, and the higher this figure, the worse the water quality.

[13] Suspended Solids (SS) Concentration is an indicator used to determine whether the facility operates properly by observing water turbidity.

(See Table 1), thus achieving the desired end result. The project was the first in Malaysia to construct large-scale sewerage treatment facilities in terms of capacity at 13 sites nationwide and can thus be said to have largely helped expand the percentage of people served with sewerage treatment facilities. For information, the actual data for the ST is not provided because users are now responsible for desludging ST, thus out of service from IWK due to the introduction of WSIA 2006.

Table 1 Target and actual of percentage of population served, operated and maintained by IWK

	Baseline (1998)	Target[14]	Actual (2013: 3 years after completion)
STP	21.3 %	27.0 %	68.8 %
ST	17.5 %	24.4 %	-
Total	38.8 %	51.4 %	68.8 %

Source: Documents provided by JICA and IWK.

(2) Water Quality Improvement

Table 2 shows target and actual BOD concentrations of treated water (outflow) at each target plant of the project. At the time of appraisal, the BOD concentration of treated water at each plant was expected to be below 20mg/L. The actual BOD concentration was much lower than 20mg/L at all target STPs and achieved the target, therefore improved water quality of the target STP was confirmed.

Regarding SS, which quantifies the small solid particles remaining in water, neither baseline nor target value were set[15], which made it difficult to compare or understand the attainment level. When the environmental standard defined by the Department of the Environment (DOE) in Malaysia was confirmed, the actual SS concentration at all target STP met the A level (below 50), which is categorized as the best water quality (See Table 3.)[16] Accordingly, it was confirmed that the treated water quality of the target STP for the project was high.

[14] Initially, this project was scheduled for completion in 2003 (See "3.4.2.2 Project Period" for the details), thus the target year was set between 2004 and 2010.
[15] Since SS concentration was not set as the operation and effect indicators of this project at the time of project appraisal, neither baseline nor target values were listed. On the other hand, IWK provided the information that the target value (outflow) in the design manual was 40mg/l.
[16] In addition, the actual SS concentrations (outflow) at all STP have achieved the target value (40mg/l) which was provided by IWK as a reference.

Table 2　BOD concentration

	Target (Outflow)	Actual BOD concentration(mg/l)（Annual average）			
		2012		2013	
		Inflow	Outflow	Inflow	Outflow
Bunus	20	180.3	4.2	163.9	3.3
Pantai		226.1	3.2	204.5	3.5
Bandar Tun Razak		180.6	2.2	146.1	3.9
Puchong		125.2	2.7	126.9	2.7
Sungai Nyior		75.1	11.4	66.6	4.0
Juru		64.8	12.7	43.9	4.3
Kangar		82.1	9.1	2,298	2.6
Damansara		176.5	2.1	231.1	2.4
Sunggala		24.7	2.0	31.3	2.0
Kuala Sawah		72.0	3.9	62.8	8.5

Source: Appraisal documents provided by JICA and data provided by IWK

Notes: Data of CSTF is not included. Annual average is calculated based on the average of each month. The actual data for 2013 shows the average up to September 2013. The reason of high BOD concentration of inflow in 2013 was not explained clearly, thus it is likely to be caused by anomalous value.

Table 3　SS concentration

	Target	SS concentration (mg/l) Actual （Annual average）			
		2012		2013	
		Inflow	Outflow	Inflow	Outflow
Bunus	No target value	154.2	13.1	128.9	4.0
Pantai		670.4	7.9	461.6	10.4
Bandar Tun Razak		131.8	3.3	117.6	3.9
Puchong		153.3	5.6	134.3	4.4
Sungai Nyior		71.3	16.5	94.9	8.9
Juru		69.5	19.9	163.5	6.9
Kangar		172.3	12.7	29,975	12.4
Damansara		172.6	3.1	232.3	10.4
Sunggala		39.3	3.4	38.3	19.8
Kuala Sawah		105.1	8.5	82.0	9.2

Source: Data provided by IWK

Notes: Data of CSTF is not included. Annual average is calculated based on the average of each month. The actual data for 2013 shows the average up to September 2013. The reason of high SS concentration of inflow in 2013 was not explained clearly, thus it is likely to be caused by anomalous value.

(3) Other Indicators (Population Served, Connection Ratio)

The population served by the target STP, not including CSTF, of this project as of the ex-post evaluation is 1,502,279 (PE[17]) which is 88% of the target (1,709,000 PE) set by the executing agency, namely the Sewerage Service Department (SSD) with 2020 as the target year (See Table 4.) Although 88% of the connection rate is considered sufficient,

[17] PE indicates Population Equivalent or converted population. PE is not a measure of population, but a numerical figure, which was converted to show the sewerage facility inflow equivalent to the water volume, regardless of the number of people in homes, commercial facilities and public facilities.

it varies from 11 to 111% depending on the STP at the time of ex-post evaluation and is particularly low in the Sunggala STP area, near where many hotels are located. The low connection is attributable to many hotels having their own small treatment facilities, and tending to avoid paying the STP connection fee[18]. In addition, the increase in residents was lower than estimated in some areas of Bandar Tun Razak, which affected the low connection rate at the time of the ex-post evaluation.

Table 4 Planned and actual population served and the connection ratio at each STP

STP	State	Planned population served	Population connected	Connection ratio (%)
Bunus	Federal Territory of Kuala Lumpur	352,000	393,660	112
Pantai		377,000	377,414	100
Bandar Tun Razak		100,000	52,434	52
Sungai Nyior	Penang	150,000	95,232	63
Juru		150,000	120,101	80
Kangar	Perlis	30,000	16,728	56
Damansara	Federal Territory of Kuala Lumpur	100,000	72,945	73
Sunggala	Negeri Sembilan	60,000	6,627	11
Kuala Sawah		240,000	200,170	83
Total		1,709,000	1,502,279	88

Source: Data provided by IWK

Note: Data as of 2012. Planned population served and population connected are shown as PE and converted population.

However, SSD considered that a certain period will be needed for the connection rate to achieve 100%, and the target year for which is set at 2020 as mentioned above (See Table 5.) Accordingly, for some STPs, it is too early to judge the achievement level for connection rate at the time of ex-post evaluation. Some STP have connection rates exceeding 100% because they use an Oxidation Pond (OP) in addition to the STP constructed by this project and data for OP are also included in the connection rate.

[18] However, the Malaysian government requested that all hotels in the Sunggala area connect to the Sunggala STP by 2016.

Table 5 Projection of connection for each facility

STP	Designed PE	2013	2014	2015	2016	2017	2018	2019	2020
		Projection for the connection							
Bunus	352,000	393,660	393,720	–	–	–	–	–	–
Pantai	377,000	377,414	381,172	–	–	–	–	–	–
Bandar Tun Razak	100,000	54,694	55,564	74,694	87,694	92,916	151,138	–	–
Puchong	150,000	167,953	–	–	–	–	–	–	–
SG Nyior	150,000	96,199	106,018	115,838	130,000	150,000	–	–	–
Juru	150,000	120,416	130,000	140,000	150,000	–	–	–	–
Kangar	30,000	16,728	17,728	19,728	22,728	24,728	26,728	28,728	30,000
Damansara	100,000	72,945	77,425	81,905	86,384	90,864	175,674	–	–
Sunggala	60,000	21,361	24,809	32,855	38,453	51,254	60,000	–	–
Kuala Sawah	240,000	223,080	240,000	–	–	–	–	–	–

Source: Data provided by SSD and IWK

3.3 Impact

3.3.1 Intended Impacts

(1) Improvement in Public Health and Public Hygiene Environment

At the time of project appraisal, improving the public hygiene environment such as decreasing the number of water-borne diseases including cholera, dysentery, typhoid, etc. were expected as the impact of the project.

As shown in Table 6, the incidence rate of water-borne diseases among patients in each State in which target STPs are located, slightly improved compared to before and after the project implementation. Meanwhile, the result of the beneficiary survey[19] conducted in this ex-post evaluation showed that only 20% of the respondents stated that the construction of target facilities had helped improve public health (See Table 7.) This reflects the fact that improvement in health was due not only to improved sewerage facilities but also other factors, and a lack of full awareness among residents of the relation between the effect of sewerage treatment and water-borne diseases, etc.

[19] To complement efforts to evaluate the quantitative effect and impact, a beneficiary survey was conducted of 100 neighbors; 25 each at four sites, Pantai, Puchong, Bandat Tun Razak and Sugai Nyior. The respondents included 51 males and 49 females, 3 of whom aged below 19 years old, 32 of whom between 20 and 30 years old, 8 of whom between 31-40, 26 of whom between 41-50 and 21 respondents aged above 50.

Table 6 Incidence rate of water-borne disease per 100,000 population

States where target STP located	Cholera		Dysentery		Typhoid	
	Before Project: 2003	After project: 2011	Before Project: 2003	After project: 2011	Before Project: 2003	After project: 2011
Perlis	0.00	0.00	0.46	0.42	0.46	0.00
Kedah	0.06	0.00	1.12	0.20	1.80	0.41
Pulau Pinang	0.00	0.00	1.34	0.00	0.21	0.06
Selangor	0.00	0.02	0.33	0.25	0.62	0.68
Kuala Lumpur	0.13	0.00	0.93	0.06	0.97	0.40
Negeri Sembilan	0.00	0.00	0.11	0.00	0.44	0.10
Melaka	0.00	0.00	0.00	0.00	0.29	0.00

Source: Health Indicators for 2003, 2007 and 2011, Ministry of Health Malaysia

Table 7 The changes of health (water-borne diseases)

【Question】 Has the incident rate of water-borne diseases improved after improving the sewerage facilities?	Largely improved	Slightly improved	Same	Slightly worsened	Largely worsened
	5%	13%	80%	2%	0%

Source: Result of beneficiary survey

In addition, the target sites are located in urban areas and the river water is rarely used for daily living purposes. Accordingly, it should be noted that the baseline data for water-borne diseases as of the project appraisal was primarily low. The incidence rate of water-borne disease is one of the general indicators used to gage the impact of the water sector project, but it is difficult to understand the causal relation with accurate figures where the project site is located in an urban area like this one and the STP outflow is not utilized as water for daily life. From this point, this incidence rate is not necessarily realistic to analyze the impact of this project. Accordingly, it can be said that the indicator for analyzing the impact had to be set based on full awareness of the nature of the project at the time of project appraisal.

(2) Improvement in the Living Environment

Improvement in the living environment was also estimated as an impact of this project by developing sewerage as well as implementing sewerage and desludging treatment. Although it cannot be said that all residents and beneficiaries understood the relation between developing sewerage facilities and improving the living environment, 55% of respondents answered that the living environment had improved by developing sewerage treatment facilities, according to the beneficiary survey result regarding changes in the living environment. The reasons were cited as improvement in: odor (75%), vector attraction (27%) and landscape aesthetics (29%.)

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

"OECF Guidelines for Environmental Considerations" (1995) was applied to implement the project and the project was categorized as B level because no major environmental issues were confirmed. In 1998, approval for the necessary procedure was also received from the DOE of Malaysia, and it was concluded that the negative environmental and social impacts of this project were limited. At the time of ex-post evaluation, SSD, as the executing agency, IWK, as the operating and maintaining institution, and the target plants confirmed that the required conditions in terms of odor, noise and water quality had been satisfied at all target plants based on their records. In addition, cases of complaints over noise, odor, etc. during and after project implementation were very limited based on the result of the beneficiary and site surveys, hence no serious issues were confirmed.[20].

3.3.2.2 Land Acquisition and Resettlement

Interviews with staff of the executing agency and target plants confirmed that no land acquisition or resettlement of residents had occurred at the target sites.

3.3.2.3 Unintended Positive/Negative Impact

(1) Decommissioning Small Plants and Reduction of Operational Cost

62 small sewerage plants located nearby the target sites were decommissioned after developing large-scale plants nationwide, which allowed savings on the operational cost. According to IWK, electricity and labor costs, which accounted for 40% of the total operating and maintenance cost at each plant, could be reduced by decommissioning small plants. Many plants constructed under this project apply the latest technology, which helps save more energy. For example, the electricity usage at the target plants is about 2kWh/PE, as compared to around 3.5kWh/PE at the old type of small plants. This difference is thus considered the operational cost saving, following the implementation of the project and the decommissioning of small plants[21].

(2) Improvement in the River Water Quality

Data to show changes in river water quality were not available when analyzing the

[20] IWK has tried to maintain a minimum service level by setting out a Customer Charter. Under this Charter, complaints over noise and odors, etc. must receive a response within 24 hours. Accordingly, the same actions were taken at the target plants while implementing the project.

[21] Decommissioning small sewerage plants and deducting operating cost; based on the information provided by IWK, it can be estimated that monthly operating cost savings of 175,305 ringgit (approximately 5.537 million yen) were achieved by decommissioning the 62 small sewerage plants.
(Calculation basis) Assumption: Capacity of each small sewerage plant assumed to be 5,000PE and electricity cost of 0.377/kWh ringgit (RM).
Calculation formula: 5,000PE×62STPs×1.5kWh/PE×RM0.377/kWh = RM175,305

effect of the project implementation. The staff of SSD, the executing agency and IWK, which is in charge of operation and maintenance, explained that the impact on the improvement in river water quality was limited while areas treated at the target plants had clearly improved. The reasons were explained as polluted water from neighboring factories largely affecting the river water quality and the outflow volume of target plants being insufficient to improve the overallriver quality. The result of the beneficiary survey also showed that 71% of respondents did not perceive any change in the water quality of the neighbouring river after developing the plants.

(3) Improvement in Capacity on SSD Project Management

At the time of project commencement, SSD, the executing agency, was an institution with limited project management experience. In interview surveys, SSD staff explained that they lacked experience of managing and implementing projects, despite having experience of managing or supervising tasks, meaning that operating an unfamiliar project with limited staff was a difficult task. However, the SSD staff also said they could experience the project operation and implementation and accumulate know-how after experiencing the project. For example, under the project, the project period was delayed, which was used by SSD as a lesson learned, whereupon they officially included it to regulate the Charter. The project construction period should be set as 30-36 months for developing sewerage treatment plants and 42-48 months to construct sewer pipelines, in their Charter. It can be said that SSD gained experiences by implementing large-scale sewerage plant construction projects as a first in Malaysia, which could underpin the implementation of future projects, which will be supported nationally or by other donors.

As described above, at the time of ex-post evaluation, the percentage of population served, operated and maintained by IWK and the improvement in water quality treated at the target facilities met the target, thus the project effects are confirmed. Although impacts such as improvement in public health and river water quality were limited, it should be noted that some indicators of impact lacked clear and direct relations with the project.

Hence, the project has largely achieved its objectives. Therefore its effectiveness and impact are high.

3.4 Efficiency (Rating: ①)

3.4.1 Project Outputs

The project comprised STP and CSTF as well as a sewer pipeline construction work,

and consulting service related to construction work. The planned and actual outputs were as follows:

Table 8 Planned and actual output of this project

		Planned (As of appraisal)			Actual (As of the ex-post evaluation)		
Outline of the plant construction (Sewerage Treatment Plant: STP, Central Sludge Treatment plant: CSTF)							
No.	Site	Package	Type	Designed capacity(PE)	Package	Type	Designed capacity(PE)
1	Bunus	1	STP	352,000	1	As planned	As planned
2	Pantai	1	STP	377,000	1		
3	Bandat Tun Razak	1	STP	100,000	1		As planned except the changes of treatment method
4	Puchong	1	STP	150,000	1		
5	Sungai Nyior	2	STP	150,000	2		As planned
6	Juru	2	STP	150,000	2		
			CSTF	300,000			
7	Kangar	2	STP	60,000	2		30,000
			CSTF	200,000			150,000
8	Damansara	3	STP	100,000	3		As planned
9	Sunggala	3	STP	60,000	3		
			CSTF	50,000			
10	Kuala Sawah	3	STP	360,000	3		240,000
11	Klang	4	CSTF	400,000	1		As planned
12	Sungai Udang	4	CSTF	300,000	3		
13	Kota Setar	4	CSTF	300,000	2		
14	Terengganu	4	CSTF	400,000	Cancelled		
Sewer pipeline		6 networks Pantai, Sungai Nyior, Juru, Sunggala, Kuala Sawah, Kangar			2 networks Pantai, Puchong		
Consulting services		Detailed design survey, supporting documentation for bidding and its process, assisting contract negotiation, facilitating contract performance, construction control, technical transfer to the executing agency and sub consultants and formulating an environmental management plan			As planned		

Output was almost as planned. However, the cancelation of the CSTF at Terengganu construction, capacity changes in STP and CSTF at Kangar and STP at Kuala Sawah, and changes in the numbers and sites when constructing sewer pipelines were made. In addition, the number of construction packages was revised from four to

three to make it efficient by regrouping neighboring plants, which were originally scattered geological sites, to meet the budget constraints. Means of treating sewerage were devised at Bandar Tun Razak and Puchon considering the available land, despite no change in output. The reasons for the major changes in each output are as follows:

- ✓ Cancelation of Terengganu CSTF construction: Under the project, the cost was increased due to the rise in steel price and the delays in project implementation (See details in "3.4.2.2 Project Period"), which meant the cost had to be revised to fit the planned limit. Canceling the CSTF construction at Terengganu was deemed most appropriate, given its geographical distance from other plants[22] and with project efficiently in mind. This cancelation was decided after confirming the portion of sludge which was scheduled for acceptance at the Terengganu site could be transferred to the other existing neighboring sludge treatment plant if CSTF construction was canceled at the Terengganu site. This cancelation was made to fit the scheduled project cost and after efforts to choose the site which would have least impact on the project if canceled and is thus considered appropriate.

- ✓ Capacity modification at Kangar STP and CSTF as well as Kuala Sawah STP: For the same reason as canceling Terengganu CSTF, the capacity of STPs and CSTF of Kangar and Kuala Sawah, where population growth was expected to be relatively moderate, were deduced. The utilization rates of Kangar and Kuala Sawah STPs were 89 and 87% respectively (See Table 11 of 3.5.4 Current Status of Operation and Maintenance), hence the lack of capacity is not currently confirmed.

- ✓ Modification of output during sewer pipeline construction: It was not easy to obtain approvals from local authorities and related institutions such as electricity agencies to construct the sewer pipeline. After examining the measures and considering the time and effort required by the Malaysian side, it was decided that the sewer pipeline construction planned under packages 2 and 3 (Sungai Nyior, Juru, Sunggala, Kuala Sawah and Kangar) should be performed by the Malaysian side. Construction of these sewer pipelines, which went outside the scope of this project, was completed by the Malaysian side at the time of ex-post evaluation. For the reasons described above, these changes were deemed appropriate from an efficiency perspective.

[22] While target plants are all located to the west of the Malay Peninsula, Terengganu is located in the east coast.

Kuala Sawah STP

Sungai Udang CSTF

3.4.2 Project Inputs

3.4.2.1 Project Cost

The actual project cost was 63,905 million yen (48,258 million yen from Japanese ODA loan) while a total cost of this project was planned to be 64,652 million yen (48,489 million yen from Japanese ODA loan). Thus the total project cost was lower than the planned amount (see Table 9.) Considering the fact that the construction of one plant (Terengganu) had been cancelled, however, the actual project cost was deemed to slightly exceed the planned cost[23]. The planned cost to construct the canceled plant as planned was 74.6 million RM (about 2,357 million yen), equivalent to 4.3% of the planned construction cost. Taking this into account, the total project cost was considered to amount to about 104% of the planned project cost.

The actual local currency portion exceeded the planned amount due to increases in the unit construction price, additional ground improvement works, price escalation, etc. In addition, extending the project period with additional construction work also affected the increase in cost.

[23] Construction of the Terengganu CSTF was canceled, whereupon it was decided to adjust the project cost based on plans to respond to the increased project cost caused by the project delay, etc. Meanwhile, efforts and attempts made by the executing agency, including choosing Terengganu CSTF which would have the least impact on the project after much consideration, have to be noted.

Table 9　Original and actual project costs

	Original			Actual		
	Foreign currency (million yen)	Local currency (million yen)	Total (million yen)	Foreign currency (million yen)	Local currency (thousand RM)	Total (million yen)
Construction works	33,928	20,267	54,195	15,632	1,405,196	59,998
Consulting services	845	2,285	3,130	1,647	70,597	3,859
Administration cost	0	1,909	1,909	0	0	0
Contingencies	3,393	2,025	5,418	48	0	48
Total	38,166	26,486	64,652	17,327	1,475,793	63,905

Source: Appraisal documents and internal data provided by JICA.
Note: Exchange rate　(As of appraisal)　1 Ringgit (RM) =31.6 yen,　(As of the ex-post evaluation)　PKG 1:1RM＝34.2336 yen,　PKG 2 and 3：1RM=29.079 yen

3.4.2.2 Project Period

The project period was scheduled to last for a total of 52 months, from September 1999 to December 2013. However, the project actually took 99 months, from November 2000 to January 2009, which was significantly longer than planned (190%). The main reasons for the delay are as below.

(1) Delay in Bidding Procedure

Extensive delay occurred in the prequalification[24] stage, which was implemented before the bidding procedure under the project as time was required to establish a consensus between the Malaysian government and the Japanese side on screening treatment of companies. The Malaysian government issued a notice of determination for disqualification, since one of the Japanese companies which participated in the bidding was involved in a bribery issue in Japan, although not directly related to this project. Meanwhile, the Japanese side deemed this disclaimer to the Japanese company as inappropriate based on transparency of procurement guideline and the principle of discrimination. After the Japanese side and Malaysian government carefully considered and engaged in multiple rounds of discussion, the Malaysia side met the view of the Japanese side in line with the “Instruction to Bidders”of prequalification. Accordingly, the letter notifying implementation of the bidding procedure was received and the bidding process was recommenced, which resulted in 22 months of delay. Additionally, as of the bidding, clarification of the bidding

[24] The survey, which was conducted before bidding or requesting proposals to review the integrated implementation capacity of candidate firms by the contractor, is called Prequalification (PQ). Normally candidate firms prepared the documents for PQ and the contractor sides evaluate the contents of the prepared documents. Finally only qualified candidate firms for PQ are invited for bidding.

documents and consultations took longer, delaying the bidding process due to insufficient paperwork on the bidding documents, the bidding price exceeding estimates over 10%, etc.

(2) Additional Ground Improvement Works

The result of the scrutinized ground survey showed that the ground foundation was weaker than the original design, meaning additional ground improvement works were required and the construction period had to be extended[25]. Since Special Assistance for Project Formulation[26] (SAPROF) highlighted the weakness of ground foundation in the Malay Peninsula, works to strengthen the foundation using pile foundations, which were generally applied to the weakest ground foundation, were planned in the project. However, ground improvement works to strengthen the foundations with embankments became necessary at sites with significant ground subsidence, which extended the project period. Planned works to strengthen foundations were also designed based on the geological data of the surveyed target site, but no detailed boring survey[27] for the ground foundation was implemented. Accordingly, foreseeing the issue of ground subsidence around the target plants before implementing the project precisely is considered difficult.

(3) Delays in Obtaining Approval from Local Authorities and Related Institutions

Regarding the sewer pipeline construction in package 1, gaining approval from local authorities and coordinating with the electricity authority, etc. took time. For example, approval from the local authority was not obtained at Puchong as planned, because the planned construction site was crisscrossed by a highway. Likewise, due to delays caused when the project started, coordination with other ongoing projects was needed, which took time at Pantai and thus significantly exceeded the planned project period. In light of these experiences, meetings to request coordination among related local authorities and institutions were held when the project was started for all projects currently implemented by SSD.

(4) Lack of Experience of the Executing Agency on Project Implementation

In Malaysia, authority and resources etc. on sewerage services were transferred from local to federal government under SSA in 1993, while the SSD was established in the Ministry of Local Housing and Local Government as the executing agency in

[25] Sites where ground improvement were needed included Bunus, Klan, Sungai Nyior, Juru, Kota Setar, Kanfar, Sunggla and Kuala Sawah.

[26] Special Assistance for Project Formulation (SAPROF) is an additional survey conducted by entrusted consultants to assist with project formulation efforts of recipient countries.

[27] Whether conducting a boring survey or not in the initial stages of the project is decided on a case-by-case basis. Many cases use existing geological data of the target area due to budget constraints.

1994 in line with this transfer, as a relatively young institution with a limited number of staff, e.g. 4 or 5 at the time. Moreover, this was the first project in the sewerage sector supported by foreign countries, so the lack of knowledge, experience, structure and capacity of the executing agency was considered for effecting as one of the cause of the project delay. Where institutions with limited experience are commissioned as executing agencies, as in this project, a structure to support the project management of the executing agency, such as setting the Project Monitoring Unit (PMU) and including external resources, had to be considered.

3.4.3 Results of Calculations of Internal Rates of Return (Reference only)

At the time of appraisal, the Financial Internal Rate of Returns (FIRR) was estimated as 0.69%. Under the ex-post evaluation, no recalculation was conducted because the basic condition used to calculate the appraisal was unconfirmed and measuring this benefit based on monetary value alone was difficult.

As mentioned above, although the project cost was within the plan, the actual project cost slightly exceeded the plan due to cancelation of part of the output. However, it should be noted that this change was necessary to keep the project cost on budget because the cost had been estimated to exceed the original plan due to price escalation and additional construction work. The project period was extended significantly beyond the planned period (192%) due to the additional construction work and the longer time required to obtain approval from local authorities on construction. Therefore, efficiency of the project is low.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

Except for some area, IWK manages the Operation and Maintenance (O&M) works of all sewerage plants in Malaysia. IWK employed 77 staff for management, 1,032 for administration at its headquarters, and a total of 2,856 as of 2011; 1,747 of whom are engaged in O&M tasks at each plant. In sewerage sector in Malaysia, other than IWK, SPAN is responsible for setting rules, regulations and pricing and SSD as the implementing and supervisory agency, also oversees the technical advisory role on sewerage to the government.

With consideration of the institutional aspect of IWK, which is responsible for O&M, the number of staff is minimal considering the enormous number of plants (about 6,000 plants). For example, Kangar STP conducts O&M tasks for more than 50 small STPs in the covering area, as well as the target STP with five O&M staff. In addition, the high staff turnover is also raised as a current IWK issue, according to the

IWK staff of headquarters as well as each plant. Though the official turnover of IWK could not be obtained, issues caused by the high turnover, including lack of sharing information at the time of handover as well as O&M of inexperienced staff, have to be resolved in future. In the interview survey with IWK staff, the high turnover was attributed to low staff salaries, but improvement was considered difficult, due to the poor financial condition of IWK (Refer to 3.5.3 Financial Aspects of Operation and Maintenance for details.)

3.5.2 Technical Aspects of Operation and Maintenance

IWK is an experienced institution, which has long been tasked with responsibility for O&M of sewerage facilities in Malaysia. Accordingly, the enrolled staff have abundant knowledge and experience of O&M, and are also regularly trained to ensure they have the basic skills required. The training comprises not only internal training, which is conducted regularly and on joining the IWK, but additional external training opportunities. For example, IWK staff participated in JICA country-by-country training held at Obihiro city for O&M of sewerage facilities and treatment plants. As described above, however, minor concerns remain in terms of ensuring sustainability for technical capacity in future, due to the high turnover and many staff with less than 2 to 3 years' experience.

3.5.3 Financial Aspects of Operation and Maintenance

Table 10 shows the annual O&M cost of target plants. Although the individual circumstances differ, detailed amounts could not be obtained. However, the budget for appropriate O&M has not yet been secured, based on interview surveys with IWK and each plant.

Table 10 Annual O&M cost of target plants

(Unit: million Ringgit (RM))

	2010	2011	2012	2013
Annual O&M cost	29.0	35.6	34.3	25.1

Source: Data provided by IWK
Note: Costs in 2013 show the data until September.

Imposing a sewerage service charge had an impact on this budget insufficiency. While IWK is the public sewerage service agency with the capital of Ministry of Finance, the O&M cost could not be recovered due to the low service charge. This resulted in a persistent budget deficit, in response to which the government subsided 35 and 32% of the operation cost in 2009 and 2010. SSD, SPAN and IWK aim to minimize the government subsidy to IWK in future. The current sewerage service

charge system comprises four customer categories, namely: "Domestic[28]", "Industry[29]", "Commercial[30]" and "Government[31]". The basic charge for domestic premises in particular has remained wholly unchanged since 1997, at a very cheap charge of RM8 per month (about 250 yen). IWK and SSD explained that this charge was set by the government and SPAN and that political leverage would be required to raise charges, despite the crucial need to do so to improve the financial situation of IWK. Accordingly, this is not an issue which IWK can solve alone. In interviews with SPAN, IWK and SSD staff, however, they all agreed that the sewerage service charge (8 RM per month) is unreasonable and unsustainable considering the current price level and hence continued negotiating with government to raise the charges. In addition, under current circumstances, sewerage service charges are levied based on the annual values of land and buildings, however, it was explained that they should be unified and proportionate to water supply charges in future[32].

3.5.4 Current Status of Operation and Maintenance

O&M of sewerage facilities work requires daily inspection, assessment of water quality, regular cleaning, checking parts having deteriorated or facilities requiring rehabilitation, etc. Under current circumstances, O&M of facilities and equipment is conducted in line with Planned Preventive Maintenance and each plant is responsible for reporting to IWK (water quality to DOE). Most of the facilities and equipment of the target plants are properly maintained, although some equipment is temporarily out of service due to maintenance or spare parts required.

Conversely, some common issues included "spare parts are expensive and take considerable time to acquire", "available contractors to conduct proper maintenance are limited" and "contractors have not registered on the IWK register list, which is compulsory when requesting agents", were confirmed at several plants. Moreover, the sludge concentration rate[33] after the sludge had been concentrated using a mechanical thickener is currently about 1-2% at most of the plants, despite originally being designed for 4%[34]. One of the reasons is considered to be clogging of the mesh, but

[28] The monthly sewerage service charge levied for domestic premises is 8 RM. However, the charge for low-cost houses and government quarters in some categories is 2 RM, while houses in some villages specified by the state pay 3 RM.
[29] Industrial customers will be charged based on the total number of employees (2.5RM per head per month).
[30] Monthly sewerage service charges for commercial premises are a sum of the basic charge based on the premises annual values. For example, if the annual value is 100,001-200,000RM, the monthly charge is 120RM. Refer to IWK web site for the details. http://www.iwk.com.my/v/customer/commercial
[31] Monthly basic charge of sewerage services for government premises is 40RM.
[32] Based on the interview survey with SPAN
[33] Since sludge extracted from sedimentation tanks includes a high water content and high volume, water has to be removed to reduce the volume, which is called sludge concentration.
[34] According to the IWK, the lower than the expected 4% of thicken sludge affects the digester performance. However, the bio-gas generation is below 25% of the design value at the time of

IWK is now modifying part of this machine on a trial basis and implementing trial operation to improve the concentration rate.

Table 11 shows the treated volume and utilization rate of target plants under the project. STPs have an average utilization rate of 70%. Conversely, desludging of STs was not conducted under regular IWK management due to the enforcement of WSIA 2006, meaning the responsibility was left to users. By introducing WSIA 2006, a means of accelerating private sector participation in desludging services was assumed. However, CSTF utilization rates have remained low, given the reduced desludging frequency of STs, when the responsibility was given to users, who lacked understanding of the importance of sewerage treatment. Increasing user awareness of the mandatory need for desludging from ST, which is currently under the user's responsibility, would be an effective means of promoting desludging henceforth. Since SPAN has already recognized its importance, there will be a need to continue negotiation with government to realize it in future.

Table 11 Treated volume and utilization rate of each plant

Location of STP/CSTF		Designed capacity m^3/day	Treated volume [Note]	Utilization rate
			m^3/day	%
Bunus	STP	87,000	65,250	75
Pantai	STP	93,000	93,000	100
Bandat Tun Razak	STP	25,000	17,500	70
Puchong	STP	37,000	25,950	70
Sungai Nyior	STP	37,000	22,000	59
Juru	STP	37,000	32,797	89
	CSTF	250	27	11
Kangar	STP	6,750	6,006	89
	CSTF	140	20	14
Damansara	STP	25,000	18,000	72
Sunggala	STP	15,000	2,900	19
	CSTF	35	9	24
Kuala Sawah	STP	59,000	51,073	87
Klang	CSTF	250	33	13
Sungai Udang	CSTF	250	50	20
Kota Setar	CSTF	210	40	19

Source: Data provided by IWK
Note: Average data of 2013

IWK staff responsible for maintaining STPs has sufficient opportunities to receive O&M training and no serious O&M issue for target facilities was confirmed. Conversely, IWK as a whole has difficulties to secure sufficient staff for the appropriate O&M works,

ex-post evaluation..

and the high turnover remains an issue. From a financial perspective, some problems have been observed due to service charges which have long remained unchanged and the need for a government subsidy. Therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was conducted to improve water quality by developing 13 large-scale sewerage treatment plants, as the first project of its kind in Malaysia and helping improve public sanitation conditions. This project is consistent with Malaysian development policy and needs, both of which have prioritized the sewerage sector, and aligned with Japanese assistance policy to Malaysia, thus the relevance is high. In addition, the quality of outflow at target plants was drastically improved by developing sewerage treatment plants under this project and the percentage of population served also achieved the target number. Thanks to constructing large-scale treatment plants, demolition of small treatments plants nearby the target plants and a reduction in their operation cost were confirmed as impacts of the project. Furthermore, under circumstances where the project implementation system on the Malaysian side was not well matured, since this was the first project to construct large-scale sewerage treatment facilities in Malaysia, cases of lessons learned by the executing agency were confirmed. This involved introducing a Charter to fix the period for the sewerage project. Due to the delays in the bidding process and additional construction work, both project cost and period were significantly higher than planned, thus the project efficiency is low. In terms of the sustainability, current operation and maintenance conditions are positive, but the concerns remain over the financial capacity because of insufficient service charges and chronic deficit of the O&M institute. In the light of the above, the project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to IWK and SPAN

- At the time of ex-post evaluation, the low utilization of CSTF was confirmed, mainly due to the effect of policy changes in the water supply and sewerage sectors. Conversely, a lack of understanding of the importance of sludge treatment among residents was also raised as an issue. IWK and SPAN have currently conducted awareness activities within a limited budget, so efforts for further improvement should be continued. Meanwhile, SPAN is recommended to lobby the government continuously to make regular ST desludging compulsory.
- Low sewerage service charges have exacerbated the IWK budget crisis and it is currently unable to operate services without a government subsidy. While IWK must constantly strive to improve its financial situation, this is not feasible unless the

sewerage service charges are revised. Accordingly, ongoing efforts must be made to persuade the government to revise the service charges to secure future sustainability.

4.3 Lessons Learned

・Thorough and careful development of a contact list of agents dealing with O&M and spare parts

Some difficulties in obtaining the spare parts and missing contacts with agents regarding the equipment provided by this project were confirmed. For similar types of the project in future, the contact lists of agents for O&M and spare parts must be carefully and thoughtfully developed before completing the project, particularly for equipment or spare parts which need to be procured from overseas.

・Pre-arrangement to mitigate the risk of delays by strengthening information sharing among related parties

The project period significantly exceeded the original plan (190%). Although the delays were mainly due to external factors, including delays to the bidding process and additional construction work which was outside the control of the project, the time taken to obtain approval from local authorities and related institutions also significantly delayed the project. Such projects, on a nationwide scale and requiring approvals from related institutions like this one, must devise ways of responding to the risk involved in each delay, such as sharing the schedule when the project gets underway and progress in a timely manner to elicit the understanding of related parties.

・Establishing a support system commensurate to the capacity and experiences of the executing agency

SSD, the executing agency of this project, lacked experience of operating and implementing the work involved in this project and lacked sufficient capacity and staff as the executing agency at the project beginning stage. Where such institutions lacking experience of project implementation become executing agencies as this case, it would be advisable to establish a PMU with experts on project operation and management.

Comparison of the Original and Actual Scope of the Project

Item	Original			Actual		
1. .Project Outputs	Package	facility	Designed Capacity(PE)	Package	facility	Designed Capacity(PE)
Plants of construction works						
1) Bunus	1	STP	352,000	1	As Planned	As Planned
2) Pantai	1	STP	377,000	1	As Planned	As Planned
3) Bandar Tun Razak	1	STP	100,000	1	As Planned	As Planned
4) Puchong	1	STP	150,000	1	As Planned	As Planned
5) Sungai Nyior	2	STP	150,000	2	As Planned	As Planned
6) Juru	2	STP	150,000	2	As Planned	As Planned
		CSTF	300,000		As Planned	As Planned
7) Kangar	2	STP	60,000	2	As Planned	30,000
		CSTF	200,000		As Planned	150,000
8) Damansara	3	STP	100,000	3	As Planned	As Planned
9) Sunggala	3	STP	60,000	3	As Planned	As Planned
		CSTF	50,000		As Planned	As Planned
10) Kuala Sawah	3	STP	360,000	3	As Planned	240,000
11) Klang	4	CSTF	400,000	1	As Planned	As Planned
12) Sungai Udang	4	CSTF	300,000	3	As Planned	As Planned
13) Kota Setar	4	CSTF	300,000	2	As Planned	As Planned
14) Terengganu	4	CSTF	400,000	Cancel		
Construction of sewer pipelines	6 networks Pantai, Sungai Nyior, Juru, Sunggala, Kuala Sawah, Kangar			2 networks Pantai, Puchong		
Consulting Service	Detailed design survey, supporting documentation for bidding and its process, contract negotiation, facilitating contract performance, construction control, technical transfer to the executing agency and sub consultants and formulating environmental management plan			As planned		
2.Project Period	September 1999 – December 2003 (52 months)			November 2000 – January 2009 (99 months)		
3.Project Cost Amount paid in Foreign currency	38,166million yen			17,327 million yen		
Amount paid in Local currency	26,486 million yen (838,172 thousand RM (Ringgit))			46,578 million yen (1,475,793 thousand RM)		
Total	64,652 million yen			63,905 million yen		
Japanese ODA loan portion	48,489 million yen			48,258 million yen		
Exchange rate	1 RM = 31.6 yen (As of June, 1996)			1RM = 34.23 yen for package 1 (Average between November 2003 and July 2007) 1RM = 29.08 yen for package 2 and 3 (Average between March 2006 and January, 2009)		

Mongolia

Ex-Post Evaluation of Japanese ODA Loan Project

"Two-Step-Loan Project for Small and Medium-Scaled Enterprises Development and Environmental Protection"

External Evaluator: Keisuke Nishikawa, Japan Economic Research Institute Inc.

0. Summary

This project aimed to achieve sustainable growth and poverty reduction by promoting employment creation and environmental conservation in Mongolia through the provision of long-term funding to private small and medium-sized enterprises. While this project was consistent with the development plan and needs of Mongolia as well as Japan's ODA policy, some issues were identified in terms of the implementation approach of environmental protection measures and the plan of consulting services. Therefore, the relevance of the project was fair. With regard to project effectiveness, significant improvements were observed on the indicators for small and medium enterprise development, though the data after the project completion was not sufficiently collected. On the other hand, the effectiveness of environmental improvement was limited as a whole as it cannot be said that sufficient data for environmental protection-related indicators was captured, and definitions of the environmental protection project were ambiguous. In terms of project implementation, the efficiency of the project was high, as the project cost and period were both within the plan. With regard to operation and maintenance, the sustainability was judged to be fair as there were some issues in the institutional and technical aspects, while no issues were identified in the financial aspect and the current status.

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

1. Project Description

Medical equipment purchased with the sub-loan from this project (Obstetrics department at a hospital in Ulaanbaatar)

Water purifier purchased with the sub-loan from this project (Purified water manufacturer in the suburb of Ulaanbaatar)

1.1 Background

In Mongolia, a market-oriented economy was promoted under the support from international organizations and bilateral donors since the beginning of the 1990s, and economic liberalization, sales of state-owned assets and stabilization of macro-economy progressed. In the corporate sector, a number of private businesses were established and the number of registered companies increased substantially, as the market-oriented economy was promoted. Out of the registered companies, small and medium enterprises (hereinafter referred to as SME) with less than 50 employees accounted for 98% of the total companies, 32% of the total sales and 42% of the total employees, playing a vital role in terms of employment and production in the Mongolian economy. In response to higher capital needs associated with the growth of the Mongolian economy, credit specifically for private businesses had expanded, but bank lending was mostly for short terms within a year, and nominal lending rates stayed at high levels due to higher credit risks and deposit interest rates hovering at high levels reflecting competitive deposit acquisition. Under such circumstances, long-term funding needs for capital investment were not met for SMEs, particularly for SMEs with lower creditworthiness. A know-how related to long term lending and lending to SMEs was not sufficient in the banking sector, and human resource development in this sector was also an urgent issue.

With regard to the environmental sector in Mongolia, especially in the capital Ulaanbaatar, where economic activities are concentrated, heating with the use of coal which was a main source of energy in the country increased with the population increase due to migration from rural regions and economic development. Coupled with basin-shaped landform, it had caused serious air pollution and health problems, and a treatment of waste water, waste products, etc. had also become problematic.

1.2 Project Outline

The objective of the project was to support private sector development and environmental protection by providing long-term finance to small and medium-scaled enterprises mainly in agricultural and industrial sectors for their capital investment, to projects for environmental protection, and by providing technical assistance to commercial banks and small and medium-scaled enterprises, thereby contributing to sustainable growth through employment creation and environmental protection, as well as poverty reduction in Mongolia.

Loan Approved Amount / Disbursed Amount	2,981 million yen / 2,971 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March, 2006 / March 2006
Terms and Conditions	Interest Rate 0.75% Repayment Period 40 years (Grace Period) (10 years) Conditions for Procurement General Untied
Borrower / Executing Agency	Government of Mongolia / Counterpart Steering Committee (CSC)
Final Disbursement Date	July, 2011
Main Consultant	KRI International Corporation (Japan)
Feasibility Studies, etc.	"Two-Step-Loan Project for Small and Medium-Scaled Enterprises Development and Environmental Protection" Special Assistance for Project Implementation (2009)
Related Projects	[ODA Loan] - Two-Step-Loan Project for Small and Medium-Scaled Enterprises Development and Environmental Protection (Phase II) (L/A singed in November, 2010) [Technical Cooperation] - The Mongolia-Japan Center for Human Resources Development Project (Phase I: January 2002 – January 2007, Phase II: January 2007 – January 2012) - Project for Capacity Development of Business Persons through Mongolia-Japan Center for Human Resources Development (January 2012 – January 2015 (plan)) - Ulaanbaatar City Air Pollution Measures Capacity Development Project (Phase I: March 2010 – March 2013, Phase II: November 2013 – November 2016 (scheduled))

	[Other Donors] - The World Bank, "Private Sector Development Credit Project 1 and 2" - KfW, "SME Project" - Asian Development Bank (ADB), "Financial Sector Reform", "Housing Sector Finance"

2. Outline of the Evaluation Study

2.1 External Evaluator

Keisuke Nishikawa, Japan Economic Research Institute Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: August 2013 – November 2014

Duration of the Field Study: October 13 – 29, 2013 and March 31 – April 5, 2014

2.3 Constraints during the Evaluation Study

With regard to quantitative indicators to evaluate effectiveness, it was not specified that the executing agency would collect and develop data from the sub-loan borrowers after this project was completed at the end of 2009. As for environmental protection-related indicators, monitoring activities of indicators were not sufficiently conducted during the project implementation as neither a definition of 'environmental protection' has been set, nor quantitative indicators have been determined. Therefore, this ex-post evaluation survey was conducted under the limitation of data related to these indicators.

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

3.1 Relevance (Rating:②[2])

3.1.1 Relevance to the Development Plan of Mongolia

3.1.1.1 SME Policy

In Mongolia, a market-oriented economy was promoted from the beginning of 1990s, and economic growth and poverty reduction progressed with the private sector development as a driving force. An SME policy during the appraisal of this project was the poverty reduction strategic paper 'Economic Growth Support and Poverty Reduction Strategy (EGSPRS)' formulated in July 2003, in which an establishment of institutions and environment, as well as human resource

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

[2] ③: High, ②: Fair, ①: Low

development for transition to market economy and private sector-led growth, was listed as one of five focused areas. The government's 'Action Plan for 2005-2008', prepared at the end of 2004 based on the EGSPRS, placed an emphasis on support to SMEs and enhancement of financial intermediation capacity as a focused area.

At the time of ex-post evaluation, the 'Millennium Development Goals-Based Comprehensive National Development Strategy' targeting the year 2021 put forward an acceleration of economic growth and a creation of knowledge-based economy in the medium to long-term. In addition, the 'Action Plan for 2012-2016' lists five areas including the pursuit of securing employment and income as well as environmental protection as major goals. Furthermore, the 'SME Development Program' for 2014-2016 was being formulated, which was expected to have five objectives, such as a provision of taxation and financial support mechanisms to SMEs, and a support to SMEs in market expansion which are under three programs, such as the development of the business environment, and industrial parks.

3.1.1.2 Environmental Sector Policy

At the time of project appraisal, EGSPRS, described above, listed the promotion of a well-balanced environment and sustainable regional development as one of the priority areas.

An approach to place importance on the environmental sector was observed consistently after that. At the time of ex-post evaluation, the 'Action Plan 2012-2016', indicating the overall policy direction, positioned green development as the cornerstone, with a particular focus on the development of renewable energy. Also, in 2012, a number of environment-related laws were streamlined by integrating 18 similar laws into eight laws. In this way, environmental laws and systems have been strengthened.

3.1.1.3 Financial Sector Policy

At the time of project appraisal, the 'Action Plan 2005-2008' placed the strengthening of the financial institution's intermediation function as a priority challenge, and had a policy to maintain the soundness of the financial sector and promote the development of the financial sector led by the private sector based on market rules. It also listed a policy to provide long-term finance through private financial institutions and to foster long-term financing market.

At the time of ex-post evaluation, the 'Action Plan 2012-2016' has set out a plan to continuously supply long-term finance to the private sector through an establishment of a credit funds for textile and leather industries and an expansion of an SME

development fund to promote a livestock industry as a concrete measure of policy promotion for economic diversification.

Based on the above, this project can be said to have been consistent, both at the time of appraisal and ex-post evaluation, with Mongolia's SME development policy, strengthening of financial intermediation functions which support it, and the environmental protection policy.

3.1.2 Relevance to the Development Needs of Mongolia

3.1.2.1 Development Needs of Small and Medium Enterprises

At the time of project appraisal, it was an issue that a long-term finance of over a year for investment purposes was in short supply, particularly for SMEs with lower creditworthiness, despite high demand. A lack of know-how in various areas in the SME sector was hampering its growth and it was highly necessary to develop human resources in the areas such as management, finance, accounting, marketing, loan application, etc.

At the time of ex-post evaluation, while the number of firms has steadily increased, the structure in which the majority of private firms are SMEs (companies with less than 50 employees account for 96% of the total firms (2012)) has not changed (Table 1). It was observed from related government ministries comprising the executing agency, financial institutions, and companies visited, that support for SME development was continuously essential from the viewpoint of maintaining sustainable growth through diversification of domestic industries.

Table 1: Number of Private Firms in Mongolia

Number of Employees	2006	2007	2008	2009	2010	2011	2012
1 – 9	24,848	25,703	29,879	30,272	34,827	38,797	43,503
10 – 19	2,701	2,830	3,123	3,156	2,738	4,363	3,732
20 – 49	2,139	2,351	2,286	2,253	2,180	3,256	2,824
SMEs Total	**29,688**	**30,884**	**35,288**	**35,681**	**39,745**	**46,416**	**50,059**
Over 50	1,129	1,221	1,210	1,196	1,176	1,670	1,881
TOTAL	**30,817**	**32,105**	**36,498**	**36,877**	**40,921**	**48,086**	**51,940**

Source: Statistical Yearbook 2013 (National Statistical Office of Mongolia)

In terms of finance, firms are mostly dependent on the borrowing from banks holding more than 90% of the asset in the financial sector for their procurement of

funds. However, as a collateral requirement by banks is rigid and it is mainly real estate that is approved as collateral, it was heard from the interviews with SMEs that it was not rare that they could not receive sufficient loans.

3.1.2.2 Development Needs in the Environmental Sector

At the time of appraisal, as the air pollution problem in Ulaanbaatar was serious enough to cause health problems such as asthma in children, it was needed to switch from raw charcoal for fuel to coal-processed fuel such as charcoal briquette and to reduce the use of wood for ignition. However, it was difficult for the firms in this business area to obtain long-term funding for capital investment conducive to environmental improvement as the margins from investment were regarded generally low.

After that, rapid economic growth in Mongolia has led to an increase in the use of charcoal for heating, especially in winter in Ulaanbaatar, resulting in continuing serious air pollution. Although it was difficult to obtain data on annual changes in air pollution in the medium term at the same point, survey results and reports on air pollution have been published by JICA, World Health Organization (WHO), World Bank (WB), etc., showing that air pollution has been an ongoing issue to be resolved, even at the time of ex-post evaluation. In addition, there are still problems such as aggravation of water quality and soil contamination. While the environmental laws were gradually developed, a funding system for environmental protection projects cannot be said to have been well established at the time of ex-post evaluation.

3.1.2.3 Development Needs in the Financial Sector

At the time of project appraisal, a lack of know-how in various aspects such as the appraisal of long-term finance was hampering the growth of the banking sector in the financial sector in Mongolia, and it was considered highly necessary to develop human resources in long-term finance, risk assessment regarding credit for SMEs, asset management, and so on.

As a medium to long-term financing framework for SMEs in Mongolia, an SME Development Fund (with an interest rate of 7% at the time of ex-post evaluation and a repayment period of up to 5 years) was established in 1992, but few loans were made at its initial stage due to insufficient financial resources within the government. It gradually increased the amount of loans as the demand for funding became stronger, and the total amount of credited loans reached 390 billion Tugrik (approximately 23.68 billion yen (converted based on the rate in January 2014: Bank

of Mongolia)). The WB[3] and KfW also implemented two-step-loan projects for private firms, but insufficient conditions of funding supply against demand have continued, as shown in the government survey result estimating that the private sector is still in need of 500 billion Tugrik (approximately 30.36 billion yen) in funding.

As shown above, while the majority of private firms are SMEs and their development is positioned essential for economic growth, and funding needs in the private sector are strong, insufficient collateral owned by SMEs and the limitation of low-interest and long-term loan systems have inhibited smooth financial arrangements. As for the environmental sector, Ulaanbaatar's air pollution in winter has been serious from the appraisal period to the ex-post evaluation period, and long-term financial arrangements for environment-related projects have remained uneasy.

Therefore, development needs in developing SMEs, improving the environment and fostering the financial sector have been high throughout the period from appraisal to ex-post evaluation. This project can be said to have been implemented by reflecting such development needs.

3.1.3 Relevance to Japan's ODA Policy

At the time of project appraisal, Japan's 'Country Assistance Policy for Mongolia', formulated in November 2004, and listed assistance to institutional development and human resource development for the transition to a market economy as one of the priority areas. Also, JICA's Medium-Term Strategy for Overseas Economic Cooperation Operations (FY2005-2007) also had an assistance policy to support a market-oriented economic reform including industrial development, institutional development and human resource development, to lift regional economies, and to provide support on intellectual cooperation and technical assistance for sector reform.

This project had an aim to provide financial support for the development of increasing SMEs and develop capacities of financial institutions in providing loans in Mongolia, and also support environment protection activities by firms. Therefore, this project can be said to have been consistent with the 'Country Assistance Policy for Mongolia' as well as JICA's Medium-Term Strategy for Overseas Economic Cooperation Operations.

3.1.4 Appropriateness of the Implementation Approach

As shown above, it was drawn that this project was consistent with Mongolia's

[3] A total of 22.57 million US dollars was provided over two phases between 1995 and 2011.

development policy, development needs, and Japan's ODA policy. However, as described in detail later, sub-loans for environmental protection to support environmental protection efforts did not have definitions[4] of environment-related projects eligible for loans, and their effect indicators with project implementation and monitoring mechanisms were not established. Based on these lessons, it was confirmed that the following project (Two-Step-Loan Project for Small and Medium-Scaled Enterprises Development and Environmental Protection (II)) formulated its own environmental guideline regarding the components of environmental protection loans (EPL), defining what kinds of projects would be approved as the EPL projects. Nonetheless, this project did not have a sufficient project design in its approach to achieve project objectives, and it was considered necessary to formulate a more concrete project plan by clarifying eligible project areas, selection processes and effective measurement methods, etc. to generate expected project outcomes.

However, having noted that there was an issue that the project planning was not sufficient, an introduction of EPL itself in this project to resolve environmental problems, such as air pollution in Mongolia, is consistent with development policies and needs. Also, it can be judged that an approach adopted by the project did not essentially hamper the generation of project effects.

Also, while there was a plan that a revolving fund would be established to manage funds with the repaid loans to be refinanced, a formulation of an operational guideline of the fund was not included in the initial components of consulting services. As a result, there emerged a need to add the consulting work item to formulate the operational guideline during the implementation of the project. On this point, it was also necessary to have formulated a more concrete plan in advance to sustain the effects generated in this project.

In light of the above, while this project was highly relevant to the development policy and development needs of Mongolia as well as Japan's ODA policy, there was a problem in terms of project implementation approach. Therefore, the relevance of the project is fair.

3.2 Effectiveness[5] (Rating:②)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

As illustrated in Figure 1, this project had a mechanism where the funds provided as Japanese ODA loan were sub-loaned to Participating Financial Institutions (hereinafter

[4] A bee farming business and a soap manufacturing with waste oil are the examples. The following project introduced a guideline on EPL and these sub-projects would not be approved as EPL projects.

[5] Sub-rating for Effectiveness is to be put with consideration of Impact.

referred to as PFI) by the Counterpart Steering Committee (hereinafter referred to as CSC) of the Government of Mongolia, which are then provided to SMEs, the end users, in the form of long-term funds. In conjunction with JICA's technical cooperation project, 'The Mongolia-Japan Center for Human Resources Development Project'[6], this project was designed to assist SMEs and PFIs with the development of capacity in business planning and long-term funding assessment through consulting services.

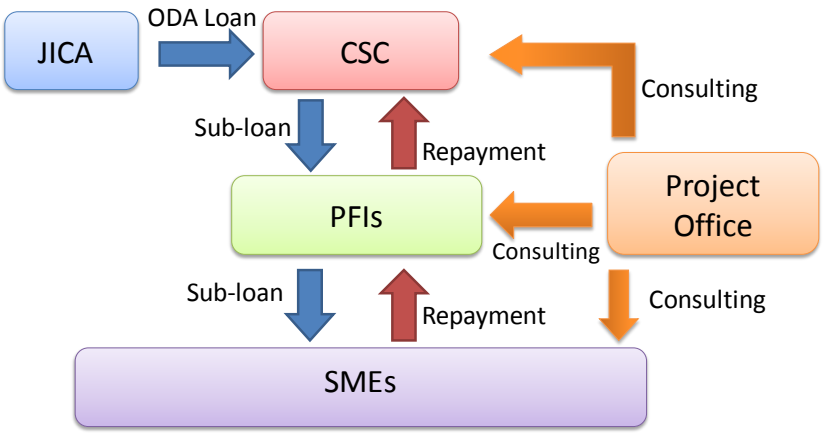


Figure 1: Funding Scheme of the Project

At the time of project appraisal, indicators related to sub-loans[7] and performance of SMEs that received sub-loans were expected to improve as project effects, as shown in Table 2. As the year to measure the achievement level of target figures of each indicator had been set to be two years after the completion of the project, the comparison was planned to be made against the actual figures of 2011 as the project was completed at the end of 2009. However, there was no mechanism in place in this project that the executing agency would continue to collect and develop the indicator figures after the end of the project period. Therefore, many indicators show the figures of the end of 2009, when the funding ended through this project, as the actual figures. Concretely, the details are shown in Table 2.

[6] A technical cooperation project that established business courses in Mongolia, where the economy was in transition to market economy, to support the fosterage of Mongolian entrepreneurs, to develop local Japanese language teachers and improve their teaching skills by running Japanese courses.
[7] In this report, 'Sub-project' refers to the projects of each firm that received funds in this project, and 'Sub-loan' refers to the funding to those sub-projects.

Table 2: Achievement Level of Project Effect Indicators

Indicator	Target (two years after project completion (expected to be the end of 2011))	Actual (end of 2009)
Non-performing sub-loan cases under the project (%)	10% or less	1.5%
Non-performing sub-loan amount under the project (%)	10% or less	3.16%
Number of seminars for PFIs and SMEs	50 times and over	13 times (for PFIs)
Sales increase by SMEs under the project (%)	20% and over	147.5%
Operational profits increase by SMEs under the project (%)	10% and over	126.8%
Employment additionally created under the project (%)	10% and over	156.3%
Increase of credit to SMEs (%)	10% and over	8.57%
Percentage of long-term credit (more than 1 year) in total credit to private enterprises	40% and over	78.1%*
CO_2 emission amount under the project (tons/year)	Decrease, compared to the time of sub-loan approval	850 tons/year
NO_x emission amount under the project (tons/year)	Decrease, compared to the time of sub-loan approval	116.4 tons/year
SO_x emission amount under the project (tons/year)	Decrease, compared to the time of sub-loan approval	204.0 tons/year
Dust emission amount under the project (tons/year)	Decrease, compared to the time of sub-loan approval	640 tons/year
Amount of resources recycled under the project (tons/year)	Increase, compared to the time of sub-loan approval	Coal waste: 92 tons/year Vegetable oil: 117 tons/year Industrial oil: 260 tons/year
BOD amount (tons/year)	Decrease, compared to the time of sub-loan approval	Decreased by 1,081.6 tons/year
COD amount (tons/year)	Decrease, compared to the time of sub-loan approval	Decreased by 8,135.5 tons/year

Source: Data provided by Executing Agency, Bank of Mongolia
Note: Actual values of long-term credit ratio are for 2011

The above data on financing to SMEs were collected by the consultant team by the end of 2009 from 125 SMEs financed during the project period and from a total of eight PFIs related to the project. After 2010, each PFI has been checking the repayment part only and it was not possible to track most data related to the indicators. However, regarding the repayment status of the 125 firms funded with sub-loans by 2009, the rates of non-performing sub-loan cases and the amounts were 4.0% and 0.96% respectively in 2013, according to the reports from each PFI, indicating that target figures have continuously been achieved. The rate of increase of credit to SMEs was 8.57% as of the end of 2009, already reaching over 80% of the target while not achieving the target. Also, while it cannot be confined as the direct effects, it can be

considered from the data that a long-term funding environment has been steadily developed with the implementation of this project, as shown in the percentage of long-term credit (more than one year) in Mongolia's financial market reaching almost twice the target figures in 2011.

With regard to the changes in the performances of financed SMEs, it was confirmed that sales, operational profits and employment had all exceeded the target figures substantially by the end of 2009, and a beneficiary survey[8] also found that 93% of the SMEs replied that their businesses expanded/improved with the sub-loans in this project.

On the other hand, it had been difficult to confirm what kinds of project effects were generated in terms of environment-related indicators as no data collection was conducted during the project period. In September 2010, after the project completion, CSC, the executing agency, commissioned to an NGO an interview survey with the borrower firms to understand and estimate environmental effects. The results are as shown in Table 2, but the project effects could not be analyzed as the base figures had not been set at the time of sub-loan approvals and it was difficult to judge if the reductions were actually observed for some of the indicators. However, according to the above survey, recycling of wastes and reductions of BOD and COD discharge were confirmed, demonstrating some effects of sub-loans.

In respect of a reduction in air pollution emphasized as an environmental protection component, changes could not be confirmed as there was no annual data at the same observation point. As there were only seven EPLs for air pollution improvement, it is considered that there was limited macro-level effect to the improvement of air pollution in Ulaanbaatar.

[8] Out of all the 125 firms financed in this project during the project period, 104 firms that were traceable and cooperative to this survey were interviewed either by actual visits or phone calls. Main questions were on the loan appraisal, business development, repayment status, contribution of this project, environmental effects, and so on.

[BOX 1: A case of two-step loan on SME development 'Cashmere knit clothes production']

- Business development with approximately 10 staff members after establishment in 1992
- Loan borrowed in 2008 to purchase one automatic sewing machine and expand the building
- Long-term funding in most favorable condition out of 12 loans received over the previous 16 years. An eligibility to receive consulting services was also attractive.

<Business growth after funding>

Employees: Increased from approximately 30 to 60

Production capacity: Increased from approximately 100 to 1,000 varieties. The production volume also increased from 1,000 clothes per year to 100,000, enabling some of them to be exported.

Equipment: Increased automatic sewing machines to eight. The factory was expanded and the company's own building was built in 2010.

Introduction of new technology realized increases in both employment and sales

Automatic sewing machine purchased

[BOX 2: A case of two-step loan on environmental protection 'Boiler improvement project'

- After the establishment in 2000, heating was provided to junior high schools and kindergartens at three locations on the outskirts of Ulaanbaatar. It was very inefficient as the boilers made of bricks consumed a significant amount of fuel.
- The loan was received in 2008, and new and more fuel-efficient boilers were purchased for installation at these three locations.
- Before the loan was provided, the firm had a five-year management contract with the government. When the boilers needed to be repaired, privatization was allowed if the equipment was self-invested, which led to the decision to borrow funds.

<Reduction in emissions after funding (per $1m^3$)>

NO_x (NO_2): reduced by 43.6%

SO_x (SO_2): reduced by 60.9%

Dust (ash): reduced by 21.0%

Also, annual coal consumption was reduced by 67.8%

Replacement of boilers realized substantial reduction of the emission of air pollutants and fuel costs

Boilers purchased

3.2.2 Qualitative Effects

3.2.2.1 Capacity Development of PFIs and SMEs

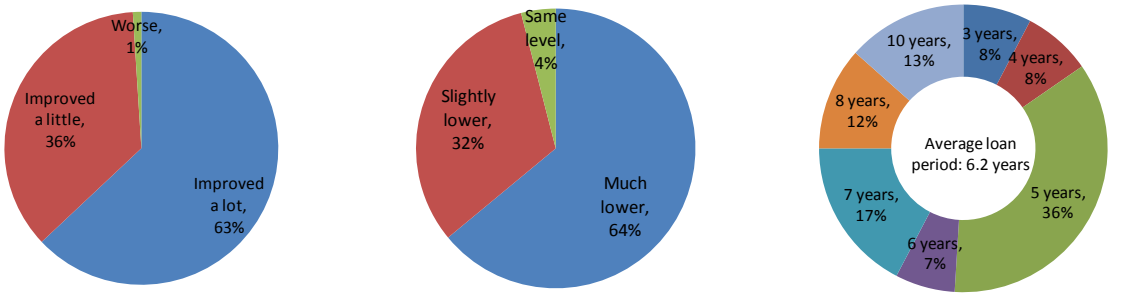
At the time of project appraisal, qualitative effects were also expected through project implementation, in addition to the provision of long-term funds, such as that loan appraisal capacities in the banking sector would improve, and that human resources in private firms would be improved by improving management, financial, and accounting capacities of SMEs. In order to achieve the capacity development, it was planned as the main activities that the consulting team would hold seminars for PFIs to support them to utilize this project and to transfer technical skills on long-term loan appraisal and that seminars for SMEs at the Mongolia-Japan Center would be utilized in collaboration with the JICA technical cooperation project.

As indicated in Table 2, seminars were planned to be held over 50 times during the project period to develop capacities, but the seminars were actually held only 13 times. While the number of seminars was much less than planned, it was judged by the executing agency that it would be more effective to instruct PFIs individually according to each circumstance rather than guiding them in the form of multiple seminars, which led to the decrease in the number of seminars on long-term loan appraisal. On the other hand, some PFIs expressed their views that it was more desirable to hold the seminars more frequently as the officers get internally transferred on a regular basis. Concerning the seminar contents, the seminars held in the capital and other regions were highly regarded by PFIs regarding the analysis necessary for long-term funding (loan appraisal, due diligence, etc.) which the bankers had not been so familiar with.

While this project did not support SMEs directly by holding ‘seminars’ to build their management and financial capacities, some business courses such as a financial management course had been implemented at the Mongolia-Japan Center since 2002, which shows that these two projects were collaborating. The percentage of firms that participated in these courses was 36% of the above-stated respondents to the beneficiary survey. Although there were only a few cases shown to demonstrate how these courses led to their capacity development in these areas, such as the improvements in production processes, it can be assumed that they made certain contributions. As for the consulting services in this project, it was observed in the interviews with the supported firms that they generally appreciated the assistance extended to them by the consultant team in preparing business plans when the SMEs applied for loan appraisals and negotiated with banks on lending conditions.

3.2.2.2 Funding Diversification

An output of this project was to supply long-term funding to SMEs. In the ex-post evaluation survey, a beneficiary survey was conducted on the SMEs financed about the use of long-term and low-interest funding to see the effects of this project. The following Figure 2 shows the responses.



Improvement in access to long-term funding | Interest rates applied | Borrowing period of fund

Figure 2: Evaluation of Funding Diversification by SMEs / Borrowing Period

In Mongolia where low-interest and long-term funding was limited, many voices were heard that this project offered very favorable conditions to facilitate fund procurement by eligible SMEs. In the beneficiary survey, almost all the firms replied that the access to long-term funding improved, including 63% of them stating that it 'Improved a lot'. It demonstrates that this project was a valuable source of long-term funding for the eligible SMEs that had been faced with a problem in securing long-term funding. It also became clear that 96% of the eligible SMEs were able to borrow at a level lower than usual interest rates. The actual borrowing period was 6.2 years on average, with 84% of the total firms borrowing for over five years. It can be said with these results that this project diversified borrowing patterns and improved the fund procurement environment for eligible SMEs.

3.3 Impact

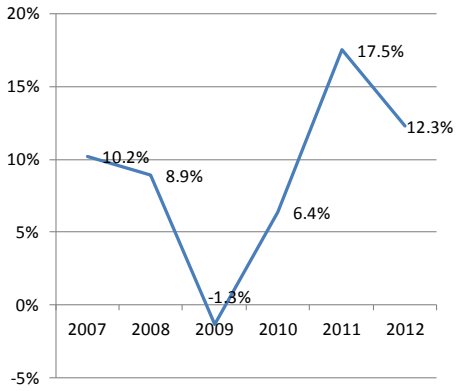
3.3.1 Intended Impacts

In this project, the impacts were expected to be 'sustainable growth and poverty reduction through employment creation and environmental protection in Mongolia' as a result of private sector development and the reduction of environmental contaminants emissions, whose effects were verified in 'Effectiveness'. To achieve these impacts, the following points were emphasized by the executing agency in assessing the borrowers

in this project.

1. Impact on employment
2. Whether the sub-project would not cause negative environmental impact
3. Whether the sub-projects would lead to import substitution
4. Whether new technologies are likely to be introduced
5. Appropriateness of bank's loan appraisal

It is difficult to measure the macro-level effects of this project due to the limitation of contributions as a single project since this project supplied long-term funds to only 0.35% of the country's SMEs (as of the end of 2009). However, the assessment criteria of the executing agency had a focus on employment increase, promotion of import substitution and introduction of new technologies, showing that the funding to sub-projects with high potential to generate positive impacts to the economy were highly valued.



Source: Asian Development Bank
Figure 3: GDP Growth Rate in Mongolia

Figure 3 shows Mongolia's annual real GDP growth rates, indicating high growth rates except for the period when the economy was temporarily hit by an influence of the Lehman Brothers crisis. Per capita GDP increased from 1,905 dollars in 2007 to over 3,000 dollars in 2010, then further to 4,909 dollars in 2012. Simultaneously, the poverty rate (WB data), though they are only the data after the project completion, is showing a decline from 38.7% in 2010 to 33.7% in 2011, then to 27.4% in 2012, demonstrating Mongolia's economic growth and poverty reduction. It is estimated that the activities of the SMEs under this project was in part responsible. In fact, 97 out of 104 firms (93%) financed in this project and were subject to the beneficiary survey responded that the long-term funds brought about business expansion and positive changes. It is considered that the funding in this project made great contributions to SME development.

3.3.2 Other Impacts

3.3.2.1 Impacts on Natural Environment

At the time of project appraisal, it was expected that the environment would

improve through improvements in air pollution in Ulaanbaatar and that energy conservation and recycling would be promoted. In light of the loan amount and business plans anticipated, no serious impacts on environment by the sub-projects were foreseen. Therefore, no large-scaled environmental impact assessment was planned for each sub-project, but the environmental and social impacts of sub-projects were planned to be checked at regular assessment meetings of the executing agency. It was judged that adequate checks would be conducted in this project as the executing agency and PFIs had experienced similar environmental and social impact checks in other donors' two-step-loan projects prior to the implementation of this project.

After this project actually started, it was required during the sub-loan appraisal to confirm the implementation of environmental impact assessment on all projects eligible for funding, and the funding condition was that the projects met all the conditions and would be judged not having any negative impacts. However, the environmental impact check was conducted only up to this process and, as stated above, no monitoring of environmental and social consideration was conducted during the project implementation, which was after the supply of loans. Neither the executing agency nor each PFI collected information to measure the project effects. Therefore, it is not clear how much positive impact the sub-loans generated. However, according to the executing agency, there were no sub-projects that affected the environment negatively and there was actually no reporting of such cases.

3.3.2.2 Land Acquisition and Resettlement

Out of 125 sub-loans in this project, no projects were accompanied by resident resettlement or direct land acquisition. While this project enabled an acquisition of real estate necessary to implement sub-loan projects as an area where the borrowed funds could be used, it was confined to the cases where, for example, additional land purchases were needed due to construction or expansions of factories, and there were no cases requiring large-scale resident resettlement.

As an entire project, regarding the changes of expected quantitative indicators, substantial improvements were observed in the indicators related to SME development. However, it also became clear that the data was only partially obtained in the ex-post evaluation as no data had been developed since the end of this project and no monitoring mechanism had been established for environment-related indicators. With regard to qualitative effects and impacts, while this project contributed positively as a whole, the overall environmental improvement by sub-projects can be said to have been

limited since not all the projects were adequately selected due to ambiguities of sub-project appraisal criteria for environmental protection, and no monitoring activities of indicators were conducted as the environment-related indicators had not been set at the time of appraisals.

In light of the above, this project has somewhat achieved its objectives. Therefore, its effectiveness and impact is fair.

3.4 Efficiency (Rating:③)

3.4.1 Project Outputs

3.4.1.1 Two-Step-Loan for SME Development / Environmental Protection

This project was designed to supply funds from the Government of Mongolia to the SMEs through PFIs in the agricultural and industrial areas as well as environmental protection by using Japanese ODA loan as a long-term financing source, and the following conditions were mainly set at the time of appraisal.

- Eligible sectors: Mainly agricultural and industrial areas (excluding real estate, military, and consumer financing businesses) or environmental protection projects
- Eligible firms: Private firms eligible for financing to which preferential corporate tax (15%) can be applied
- Funding period: 3 to 10 years (grace period: 0 to 3 years)
- Sub-loan: for equipment and working capital, 10,000 to 600,000 US dollars per sub-project (either in US dollars or Mongolian tugrik)
- On-lending interest rate (from government to PFI): LIBOR+1% for US dollars, and average deposit rates for Mongolian tugrik
- Sub-loan interest rate (from PFI to SME): Each PFI would decide on its own
- Financing conditions for environmental protection components would be the same as those for SME development components except for the confinement of sub-loans to environmental protection projects

While this project was implemented mostly as planned, changes were made mainly on the following points after the project commenced.

- Use of sub-loan for the real estate necessary to implement sub-projects would become possible, based on the agreement between the Ministry of Finance and PFIs after January 29, 2008 (but not for investment in the real estate businesses.

The use of sub-loan was allowed for an acquisition of real estate associated with project implementation)

- Reduction of preferential corporate tax rates from 15% to 10% as a result of changes in the Corporate Law of 2006

No particular effects of the reduction of preferential corporate tax rate on the implementation of this project were seen. Also, enabling of the use of sub-loans for real estate did not cause any problems either, as described in '3.3.2.2 Land Acquisition and Resettlement'.

While each PFI was expected to set its own sub-loan interest rates freely, they were managed by CSC in practice from the viewpoint that it was important to realize funding at interest rates lower than general market rates in this project. The following table shows that the sub-loan interest rates were 'On-lending rate (LIBOR+1%) + 3.60%' for US dollars and 'On-lending rate + 4.00%' for Mongolian tugrik.

Table 3: On-lending and Sub-loan Interest Rates

(Unit: %)

Period	On-lending Rate (Government to PFI)		Sub-loan Rate (PFI to SME)	
	In USD	In MNT	In USD	In MNT
January to June, 2007	6.40	5.70	10.00	9.70
July to December, 2007	6.38	5.90	9.98	9.90
January to June, 2008	5.83	5.90	9.43	9.90
July to December, 2008	4.11	5.90	7.71	9.90
January to June, 2009	4.11	5.90	7.71	9.90
July to December, 2009	2.11	4.80	5.71	8.80
January to June, 2010	2.11	4.80	5.71	8.80
July to December, 2010	1.75	4.80	5.35	8.80
January to June, 2011	1.46	4.50	5.06	8.50
July to December, 2011	1.40	4.00	5.00	8.00
January to June, 2012	1.80	4.00	5.40	8.00
July to December, 2012	1.70	4.00	5.30	8.00
January to June, 2013	1.51	4.00	5.11	8.00
July to December, 2013	1.40	3.00	5.00	7.00

Source: Data provided by the Executing Agency
Note: USD – U.S. Dollar, MNT – Mongolian Tugrik

The sub-loan rates were treated differently from the original plan, in fact, under the control of the central bank. It became a merit for SMEs, as the interest rates were kept substantially lower than the average lending rates (generally 18-20% at the time of ex-post evaluation). As mentioned above, lower interest rates were highly regarded by the firms that received funding, and it is assumed that there were no issues as a result. For the PFIs, though the margins were smaller than ordinary

lending, they were mostly positive about their participation in this project from a point of view that they could explore new customers and promote the business expansion of SMEs.

3.4.1.2 Consulting Services

The consulting services were included as a component of this project to support the implementation of this project and to support capacity development of PFIs and SMEs. Specifically, it included project management, provision of support on capacity development for the executing agency, PFIs and SMEs, as well as conducting of surveys on the development of long-term finance market in the country. For this purpose, an input of

- Advisor on project management / PFI seminars: 8MM (International consultant)
- Project coordination / management: 39MM (Mongolian consultant)
- Advisor on SME seminars: 27MM (Mongolian consultant)

was planned.

However, the input increased significantly from the original 74MM to a total of 153MM after the commencement of the project to enhance activities on sub-loan processing and management as well as capacity development of the executing agency and PFIs (International consultant: 16.8MM, Mongolian consultant: 136.3MM). Particularly, instructions to PFIs on project finance, establishment of the loan administration system and the operational policy of the revolving fund, and support to the executing agency on project implementation were strengthened through additional inputs. The provision of these additional services by the consultants was requested by the Government of Mongolia for the smooth implementation of the project, and a portion exceeding the limit of the L/A amount was additionally implemented with the cost borne by the Mongolian government. These additional services are considered to have led to the smooth implementation of advising services to the financed firms after the ending of the loans from the project's primary loan account, and the smooth formulation of the operational policy of the revolving fund. PFIs and SMEs highly appreciated the support by the consultant team and it can be said that the additional inputs led to appropriate effects. However, as stated in 'Sustainability' there was an aspect where these inputs did not necessarily lead to the development of the executing agency's institutional capacities.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The planned project cost was 3,141 million yen (foreign currency portion: 2,981

million yen, local currency portion: 160 million yen), out of which Japanese ODA loan was 2,981 million yen, the entire amount of the foreign currency portion.

Table 4 summarizes the original and actual costs in a comparable format.

Table 4: Comparison of Original and Actual Project Costs

(Unit: million yen)

Item	Original		Actual	
	Total	ODA Loan	Total	ODA Loan
SME development loan	2,297	2,297	2,297	2,297
Environmental protection loan	573	573	573	573
Consulting services	90	90	120	98
Contingency	21	21	3	3
General administration cost	160	0	0	0
TOTAL	3,141	2,981	2,993	2,971

Source: Project Completion Report and data provided by JICA

As stated later, the executing agency was not a permanent establishment but a meeting body consisting of representatives from agencies concerned in the Government of Mongolia. No special budget appropriation was made to the Ministry of Finance, which was taking a role as the secretariat, and the role was taken as part of their routine work items. Therefore, no administration cost was budgeted. On the other hand, additional costs associated with the increase in consulting services as stated above were covered by utilizing the contingency and expenditure by the Mongolian government. As a result, the total project cost was within the plan at 2,993 million yen (96% of the plan) and the cost of this project (Japanese ODA loan) was also mostly as planned (100% of the plan), as shown in Table 4.

3.4.2.2 Project Period

The original and actual project periods of this project are as shown in Table 5.

Table 5: Comparison of Original and Actual Project Periods

	Original	Actual	Comparison with the plan
Entire period	April, 2006 – December 2009	April, 2006 – January, 2011	100%
Breakdown	April – October, 2006: Selection of consultants October, 2006 – December 2009: Two-step-loan and consulting services	SME development loan: January, 2007 – April, 2009 Environmental protection loan: February, 2007 – December, 2009 Consulting Services: October, 2006 – January, 2011	

While the first sub-loan in this project was executed in January 2007, a selection process of the sub-projects for funding by PFIs had started by the end of 2006, and it is considered that the project was started almost as planned.

Lending through the two-step-loan in this project was completed by the end of 2009, as originally planned[9]. On the other hand, consulting services continued until January 2011, as the items shown above in '3.4.1.2 Consulting Services' were added with the request for additional project assistance by the Government of Mongolia which would bear the project cost exceeding the L/A amount. Although this addition was pointed out in 'Relevance' as having a partial problem in terms of the appropriateness of project approach, the periods required for the initially planned items and the implementation of additional items were separately regarded in the judgment of the project period. This is because the advisory services to the funded firms, and the formulation and administration of revolving fund operational policy after funding from the primary loan account ended was the addition of outputs needed to achieve the objective of this project.

Therefore, it can be judged that the actual project period for the outputs in the original plan was 44 months, as planned, and that the actual period for the extended project period for added work items was also within the planned period of 13 months (100% of the plan).

In light of the above, both the project cost and project period were mostly as planned. Therefore, the efficiency of the project is high.

3.5 Sustainability (Rating:②)

3.5.1 Institutional Aspects of Operation and Maintenance

The implementing structure of this project was not that the existing government organization would execute all the processes, but CSC, consisting of the Ministry of Finance, the Ministry of Industry and Trade, the Ministry of Food and Agriculture, the Ministry of Nature and Environment, and the Bank of Mongolia (central bank), was planned to play a role as the executing agency with a secretariat located in the Ministry of Finance. It was planned that the executing agency would select PFIs, sign on-lending contracts with PFIs, approve sub-loan applications, instruct the Bank of Mongolia to on-lend, manage this project's primary loan account and the revolving fund, and monitor the progress of sub-projects. It was also required to report quarterly to JICA

[9] At the time of appraisal, the completion of this project was defined as the completion of disbursement of two-step-loan.

the loan amount, loan numbers, sector classification, balance of each account and its operational status and delays in repayment by end users and PFIs.

At the time of ex-post evaluation, CSC was still functioning as the executing agency since a subsequent project was being implemented, and its role was unchanged. However, there were some changes in the member organizations and CSC was a meeting body consisting of eight representatives from the Ministry of Finance, the Ministry of Food, Agriculture and Light Industry, the Ministry of Nature, Environment and Tourism, the Bank of Mongolia (central bank), and the Chamber of Commerce and Industry, with the Ministry of Finance holding a secretariat role. As a result of government structural reform in 2012 in Mongolia, the industrial area of the Ministry of Industry and Trade came under the jurisdiction of the Ministry of Industry and Agriculture and the trade area under the Ministry of Foreign Affairs. CSC meetings were held once or twice a month and the project was implemented as planned. However, CSC was a meeting body without an operation team within the Ministry of Finance, the secretariat, and all the routine work was undertaken by the consultants of this project. This system has been maintained in the subsequent project. As this two-step-loan project will eventually come to an end, the consultant team will be dissolved then. But it has not been decided what kind of structure will be established to monitor the progress of sub-loan, conduct the assessment of the process after the second lending, and administer the revolving fund, which poses concerns in conjunction with the 'Technical Aspect of Operation and Maintenance'. According to a CSC member, various options were being considered regarding future organizational structure, such as establishing a special fund based on the revolving fund, incorporating this project's revolving fund into a to-be-established industrial development fund, or incorporating it into the existing SME Development Fund, but no final decisions have been made. As there was a case where a lack of establishment of a management unit of the revolving fund after the project completion caused a problem in terms of the sustainability of project outcomes in the project of a different donor, a future administration and implementation system was planned to be discussed more extensively in policy meetings soon, in anticipation of the end of the subsequent project.

It is considered to have been appropriate that CSC was established with representatives from the ministries and agencies concerned to make decisions on providing loans to the projects consistent with the policy directions on SME development and environmental protection in this project, and that there were inputs of consulting services to support the operations of the executing agency which was not well experienced in loan appraisal procedures to implement the project smoothly. However, as no section to perform the functions as an executing agency was

sufficiently established at the Ministry of Finance which was playing a role as the secretariat, and the staff members were not adequately allocated, no structure to manage the revolving fund independently was established even at the time of ex-post evaluation. It was desirable to have technical transfer from the consultants on day-to-day operations and have a section to hold CSC meetings, guide and coordinate PFIs and SMEs, and manage the revolving fund in a self-sustaining way after the completion of the project.

As for PFIs, a total of five banks: Trade and Development Bank, Khan Bank, Zoos Bank, Capitron Bank and Xac Bank, were initially selected as they had experience as PFIs in the two-step-loan projects by other donors such as WB and KfW, and they were judged to have been sufficient in terms of soundness, quality of management, growth, and corporate finance experiences. Later on, Golomt Bank was added before the commencement of this project, and Anod Bank as a PFI in January 2008. However, Anod Bank went into bankruptcy in November, 2008 due to an influence of the Lehman Brothers crisis which occurred during the project period. As Zoos Bank followed and went into bankruptcy in November 2009, the government established a state-owned State Bank and transferred all the sub-projects of Zoos Bank to State Bank. At the time of bankruptcies of these two banks, appropriate measures were taken as there were no particular troubles caused since the sub-loans were promptly transferred to other banks or to the newly-established State Bank. The implementing structures of this project differed from bank to bank, such as assigning dedicated staff members or operating within the existing organizational structure as one of the loans. It was commonly seen that the final loan decisions were made by the loan committees of the banks.

3.5.2 Technical Aspects of Operation and Maintenance

At the time of appraisal, it was judged that CSC, the executing agency, had experience in implementing other donors' two-step-loan projects in the past, and had basic structure and capacities necessary to implement this project. However, technical transfer was needed from the consultants to be employed in this project as the executing agency did not have sufficient resources and know-how on preparing manuals for PFIs and pamphlets for SMEs, capacities of day-to-day monitoring of this project and implementing guidance for PFIs, and seminars for SMEs for their capacity development. Consulting services were then incorporated as part of the project.

With regard to actual day-to-day operations, it became clear in the ex-post evaluation study that various procedures were consistently undertaken by the consultants and CSC had not been involved in the operations though it regularly held meetings and made decisions. Also, officers in charge in the Ministry of Finance have been replaced every

few years due to transfers and it was difficult to say that know-how was being accumulated at an institutional level. In other words, while CSC experienced various two-step-loan projects, they have limited actual experience, compared to what the consultants of this project had. One of the big factors for the high appreciation of PFIs and SMEs toward this project was the meticulous responses by the consultant team, but there is concern whether various operations, including the management and operation of the revolving fund, will be implemented without delay after the consultant team gets dissolved when the subsequent project is completed. It is inferred that an organizational problem of not having a permanent section and also the shortage of actual operational experiences could be an inhibiting concern for the sustainability of techniques underpinning smooth operations of the project.

In respect to the appraisal and funding capacities of PFIs, it was often heard in the interviews with each PFI that the knowledge acquired in the seminars in this project was utilized in loan appraisals and there was even a case where those who attended the project seminar organized seminars to other officers within the bank. Between the head office and branches, a decision-making authority was clearly defined according to the size of the funding, and there were no particular issues identified. Also, manuals and pamphlets prepared in this project were utilized timely at the times of appraisals, promotions, and marketing activities. The subsequent project was also making effort in disseminating the information by making pamphlets specifically for environmental protection projects, based on the lessons learned from this project.

3.5.3 Financial Aspects of Operation and Maintenance

As the CSC, the executing agency, was positioned as an internal organization within the Mongolian government at the time of project appraisal, it was to receive budget allocation from the government for its administration costs needed for project implementation. In fact, the Ministry of Finance as the secretariat and the CSC members were managing CSC as part of their routine job within the government. As the majority of operations were implemented by consultants, there were no dedicated staff or committee members, and no budget specific to this project has been allocated. In other words, there is no financial concern as it is part of the government finance.

With regard to PFIs, Table 6 shows the 2012 management indicators of the four banks which were expected as the PFI at the time of planning of this project.

Table 6: Management Indicators for Each Participating Financial Institution (2012)

	Total asset	Loan balance	Capital adequacy ratio	Non-performing loan ratio	Rate of return on assets	Number of branches
Trade and Development Bank	2,700	1,533	15.1%	1.4%	2.3%	22
Khan Bank	2,796	1,758	16.9%	1.2%	3.1%	512
Capitron Bank	204	119	17.1%	11.5%	0.6%	29
Xac Bank	1,077	623	13.0%	1.3%	1.7%	76

Source: Data provided by each bank (2012)
Note: Unit for total asset and loan balance is billion tugrik. The data of Capitron Bank are for2013.

The PFIs with the overviews obtained were all expanding their scope, and the non-performing loan ratio improved to the level of no-concern, except Capitron Bank[10]. The capital adequacy ratio and the rate of return on assets varied, but no particular issues could be seen as a whole, as shown in an example of the capital adequacy ratios of all banks meeting the regulated ratio of 12%.

As already stated, two banks went into bankruptcy during the implementation of this project. In the subsequent project, four assessment steps were introduced, such as judging the satisfaction of capital adequacy ratio, giving rating for CSC approval, etc., making the assessment criteria harsher on PFI's soundness. As a result, Capitron Bank was excluded from the PFI, and Capital Bank and Ulaanbaatar City Bank were newly selected.

3.5.4 Current Status of Operation and Maintenance

In this project, it was planned that a margin between the Japanese ODA loan rate and on-lending rate would be administered with the principal in the revolving fund of this project, and will be lent on again with the same objectives and rates as this project and also become the fund for the repayment of the Japanese ODA loan. It has been managed in this way in practice. In September 2009, an operational policy of the revolving fund was formulated and another 125 sub-loans were provided by September 2013 based on the policy.

Repayment from PFIs to the executing agency started in June 2007. The revolving fund was divided into US dollar and Mongolian tugrik accounts according to the currency used for repayment and each of them is accumulated in the Category A (for SME development projects) and the Category B (for environmental protection projects). Table 7 shows the status of repayment and lending of the revolving fund between 2011

[10] According to Capitron Bank, they were affected significantly by much of the loans for construction activities becoming non-performing loans after the Lehman crisis. The non-performing loan ratio of the Bank was 6.8% in 2008, but increased to 22.8% in 2010. It was 18.2% in 2012 but is recovering due to the disposing of non-performing loans and the increase in finance receivable. The rate came down to 11.5% in 2013.

and 2013, indicating that repayment and relending have been steadily implemented every year.

Table 7: Operational Status of the Revolving Fund (2011-2013)

(Unit: thousand USD, million MNT)

		SME Development Loan		Environmental Protection Loan	
		USD	MNT	USD	MNT
2011	Starting balance	276.7	693.5	99.7	118.3
	Repayment from PFIs	1,169.0	3,872.9	190.6	378.9
	On-lending to PFIs	1,312.4	3,979.0	0.0	38.0
	Ending balance	133.3	587.4	290.3	459.2
2012	Starting balance	133.3	587.4	290.3	459.2
	Repayment from PFIs	1,743.6	5,841.3	300.4	535.8
	On-lending to PFIs	551.4	3,436.0	0.0	0.0
	Ending balance	1,325.6	2,992.7	590.7	995.0
2013	Starting balance	1,325.6	2,992.7	590.7	995.0
	Repayment from PFIs	1,434.9	6,704.6	319.5	732.0
	On-lending to PFIs	2,177.7	8,445.0	732.8	1,408.0
	Ending balance	582.7	1,252.3	177.4	319.0

Source: Data provided by the executing agency

Note 1: USD – US dollars, MNT – Mongolian Tugrik

Note 2: As the figures are rounded to one decimal place, they may not correspond to the total value.

Table 8 shows the accumulated amount of repayment and a total relending amount from the revolving fund up to September 2013. As the revolving fund was built up steadily, approximately 1.9 billion yen (converted to Japanese yen) was funded again. The maximum amount for each sub-loan gradually increased to 400,000 dollars from its initial 200,000 dollars, making it more possible to respond to larger funding needs.

Table 8: Accumulated Repayment and Lending Amount from the Revolving Fund

(Unit: million USD, billion MNT)

	SME Development Loan		Environmental Protection Loan	
	USD	MNT	USD	MNT
Accumulated Repayment from PFIs	6.0	20.9	1.0	1.8
Accumulated On-lending to PFIs	5.6	20.5	0.9	1.5

Source: Response to the Questionnaire

Note: Accumulated amount as of September 2013, USD – US dollars, MNT – Mongolian tugrik

As mentioned above, smooth implementation of this project was enabled by the consultant team and they were appreciated by PFIs and SMEs. It can be assumed that many of the sub-loan projects are generally growing steadily as the status of repayment into the revolving fund has been positive. On the other hand, executing agency's organizational structure has not been well developed, which poses a concern as to whether the same operational records will be ensured after the consultant team becomes dissolved. Regarding the future structure, the Mongolian government was contemplating the smooth administration of the revolving fund, as described in '3.5.1 Institutional Aspects of Operation and Maintenance'. There were no particular issues concerning the financial aspect and the operational status of the revolving fund.

In light of the above, some problems have been observed in terms of institutional and technical aspects. Therefore, sustainability of the project is fair.

4. Conclusion, Recommendations and Lessons Leaned

4.1 Conclusion

This project aimed to achieve sustainable growth and poverty reduction by promoting employment creation and environmental conservation in Mongolia through the provision of long-term funding to private small and medium-sized enterprises. While this project was consistent with the development plan and needs of Mongolia as well as Japan's ODA policy, some issues were identified in terms of the implementation approach of environmental protection measures and the plan of consulting services. Therefore, the relevance of the project was fair. With regard to project effectiveness, significant improvements were observed on the indicators for small and medium enterprise development, though the data after the project completion was not sufficiently collected. On the other hand, the effectiveness of environmental improvement was limited as a whole as it cannot be said that sufficient data for environmental protection-related

indicators was captured, and definitions of the environmental protection project were ambiguous. In terms of project implementation, the efficiency of the project was high, as the project cost and period were both within the plan. With regard to operation and maintenance, the sustainability was judged to be fair as there were some issues in the institutional and technical aspects, while no issues were identified in the financial aspect and the current status.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

4.2.1.1 Necessity to Develop the Structure of the Executing Agency

In the course of project implementation, a structure in which the consultant team always extended various support to PFIs and SMEs was established, which promoted smooth project implementation. On the other hand, there was little involvement of CSC in the operations though CSC was positioned as the executing agency, and the consultant team for the subsequent project was still playing that role at the time of ex-post evaluation. With regard to the smooth implementation of funding operations from the revolving fund after a series of two-step-loan projects become completed, it is considered to be urgent to examine the structure, including the method of accumulating experience, to continue funding SME development and environmental protection projects without delay.

4.2.1.2 Data Collection to Measure Project Effects

In this project, no data collection regarding the effect indicators from SMEs has been conducted after the end of the project period. It is important for the executing agency itself to continue measuring the effects since it is beneficial to measure project effects all the time to capture medium- to long-term influences and to verify those post-project effects when considering and formulating similar plans.

4.2.2 Recommendations to JICA

As stated above, it became clear that the Government of Mongolia has not determined the policy on the future operational structure of the revolving fund. It will be important to have discussions with the Mongolian ministries and agencies concerned to promote the utilization of the revolving fund and monitor the formulation process of the policy on the operational structure, in line with the original objective that this project, including the subsequent project, will contribute to sustainable growth and poverty reduction by supplying long-term funds to SMEs at lower interest rates.

4.3 Lessons Learned

4.3.1 Necessity to Formulate Detailed Selection Criteria

In this project, no detailed policy was formulated during the planning stage on the selection criteria and monitoring method for the environmental protection component, and it is in part difficult to say that this scheme was sufficiently utilized. It is assumed to have been important to have adequate discussions among the parties concerned during the planning stage and soon after the commencement of the project. Based on the lessons learned from this project, the subsequent project made some improvements by formulating a guideline. When a similar project is planned in the future, it is desirable to thoroughly contemplate the items to be embodied so that the operations that follow will not become ambiguous.

4.3.2 Structural and Capacity Development of the Executing Agency

In implementing this project, CSC, consisting of the government agencies related to SME development, functioned as a decision making body in line with the policy direction, but the majority of practical operations were undertaken by the consultant team. While there were no troubles in terms of smooth implementation of the project, no dedicated staff members were assigned at the executing agency and no improvement in operational capacity was observed, which generated concerns on further emergence of project effects through the smooth operation of the revolving fund. Therefore, when planning a two-step-loan project, it is desired that a structure to sustain the effects even after the project period be established by allocating dedicated staff members at the executing agency right from the beginning of the project and develop the capacities of the executing agency itself through consulting services.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs	- Sub-loan from each PFI to SMEs: no planned values for SME development or environmental protection components	- Sub-loan from each PFI to SMEs: 103 sub-projects under the SME development component, 22 sub-projects under the environmental protection component: 125 sub-projects in total
2.Project Period	April, 2006 – December, 2009 (44 months)	April, 2006 – January, 2011 (57 months)
3.Project Cost Amount paid in Foreign currency	2,981 million yen	2,993 million yen
Amount paid in Local currency	160 million yen (Local currency: 1.684 billion tugrik)	None
Total	3,141 million yen	2,993 million yen
Japanese ODA loan portion	2,981 million yen	2,971 million yen
Exchange rate	1 tugrik = 0.095 yen (as of November,2005)	1 tugrik = 0.09 yen (Average between April, 2006 and December, 2009)

Republic of Uzbekistan

Ex-Post Evaluation of Japanese ODA Loan Project

"Tashguzar-Kumkurgan New Railway Construction Project"

External Evaluator: Hisae Takahashi, Ernst & Young Sustainability Co., Ltd.

0. Summary

This project was implemented for establishing a more reliable and efficient railway transport network by constructing a new line between Tashguzar-Kumkurgan and rehabilitating the existing line between Karshi-Tashguzar and thereby helping promote the socioeconomic development of the southern region. Uzbekistan has worked to strengthen transportation capacity and promotes railway development for sustainable growth, meaning this project has been highly relevant to Uzbekistan's development plan and needs. Implementing this project increased the volume of freight and passenger transport not only for target line but also the whole line in Uzbekistan, and also reduced transportation time and distance and improved railway services by enabling internal travel bypassing neighboring countries. The socioeconomic impact around the target lines was also observed. Although the efficiency of this project is fair as both the project period and cost exceeded the plan, the sustainability of the project effect is expected to be assured since the project lines are in good operational and maintenance condition and there are no concerns over institutional, technical and financial aspects on the part of the executing agency.

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

1. Project Description

Project Location

Constructed Bridge (Bridge No.5)

1.1 Background

Railways provide a dominant role in transportation of the Republic of Uzbekistan ("Uzbekistan"), which is a doubly landlocked country[1], and freight transport mainly comprises transportation of Uzbekistan Temir Yullari (Uzbekistan Railway, "UTY"). Since Uzbekistan played a role supplying natural resources and agricultural commodities under the regional specialization system of satellite

[1]A landlocked country surrounded by other landlocked countries. A person in such country has to cross at least two borders to reach a coastline.

countries during the Soviet era, part of its external transportation routes remained inside neighboring countries, such as railways, roads, and air routes. The customs clearance procedures at border crossings on these routes have often hindered efforts to enhance the certainty and efficiency of transportation.

The railway sector of Uzbekistan is regarded as an important component of economic infrastructure to develop the country and facilitate its transition toward a capitalist economy in the post-Soviet era. However, they were constructed as part of a network centering on Moscow during the Soviet era, meaning some routes are via neighboring countries as mentioned above, and have become obsolete. In addition, the facilities were deteriorated and needed to be refurbished or upgrade. Accordingly, there is a need for a swift response to construct a network of domestic route; to reduce transport cost and transport distance/time; to prepare for the increase in transport volume; and to enhance the reliability of railway transport. With that in mind, it was decided to construct a new rail line directly linking Kashkadarya and Surkhandarya provinces without traversing Turkmenistan and rehabilitating the existing railway line between Karshi and Tashguzar in Kashkadarya province with the assistance of Japan.

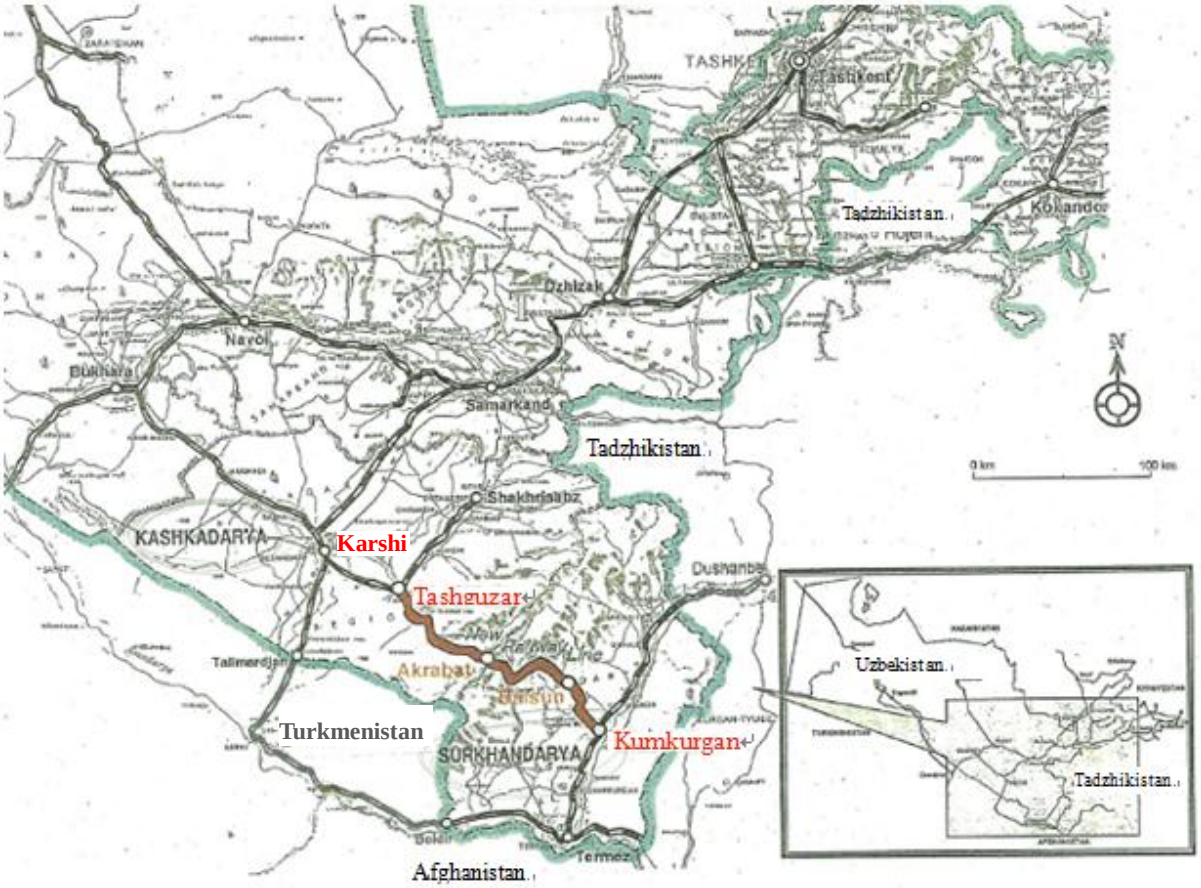


Figure 1 Railway network of Uzbekistan and the project line

1.2 Project Outline

The objective of this project is to establish a more reliable and efficient railway transport network by constructing a new railway line between Tashguzar and Kumkurgan as well as rehabilitating the

existing railway line between Karshi and Tashguzar, thereby helping promote the socioeconomic development of the southern regions (Kashkadarya and Surkhandarya provinces) of Uzbekistan.

Loan Approved Amount/ Disbursed Amount	16,359 million yen / 16,359 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	August, 2004/ October, 2004
Terms and Conditions	Interest Rate 0.4% Repayment Period 40 years (Grace Period) (10 years) Conditions for Procurement: Tied
Borrower / Executing Agency(ies)	The Government of the Republic of Uzbekistan / State Joint Stock Company Uzbekistan Temir Yullari (UTY)
Final Disbursement Date	February, 2012
Main Contractor (Over 1 billion yen)	Mitsui & Co., Ltd, Marubeni Corporation, Shimizu Corporation/ Nippon Steel Engineering Co., Ltd/ Yokogawa Construction Co., Ltd (JV)
Main Consultant (Over 100 million yen)	Japan Transportation Consultants, Inc. (JTC)
Feasibility Studies (F/S), etc.	"F/S for New Guzar–Baisun–Kumkurgan Railway Line Construction Project in Uzbekistan" JETRO, 2002 "Updated F/S for the New Guzar – Baisun –Kumkurgan Railway Line Construction Project in Uzbekistan" JTC, 2003
Related Projects	・(Technical Cooperation for Japanese ODA loan) "Capacity Development on Upgrading Track Maintenance and Train Operations Skills related to Tashguzar-Kumkurgan New Railway Line (2012-2013)" : Establishment of train operation and the improvement of cargo transport service ・(Japanese ODA Loan) "Railway Passenger Transport Improvement Project (L/A 1996)" : Construction of cargo-repair garage and purchase of new passenger carriage ・(Japanese ODA Loan) "Karshi-Termez Railway Electrification Project" (L/A February, 2012): Electrification of total extension of 325km including line between Tashguzar and Kumkurgan ・ADB "CAREC Corridor 6 (Marakand-Karshi) Railway Electrification Project" (Since February, 2012 in operation)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Ernst & Young Sustainability Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: August 2013 – August 2014

Duration of the Field Study: November 25 – December 11, 2013, April 4 – 11, 2014

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance to the Development Plan of Uzbekistan

At the time of appraisal, Uzbekistan had not prepared a comprehensive development plan on a national level, although it had promoted economic reform for stable and sustainable economic growth and poverty reduction; identifying five priority issues, including modern and comprehensive infrastructure improvement. As for the railway sector, the lack of capacity and reliable transportation hindered smooth logistics in domestic routes, which involved detours via neighboring countries when transporting between neighboring domestic provinces. Accordingly, it was the most crucial issue to strengthen transportation capacity by restructuring routes with new line, rehabilitating new track lines, constructing a double track, and electrification.

At the time of ex-post evaluation, "Welfare Improvement Strategy (2012-2015)", the development policy of Uzbekistan, has promoted the "Reconstruction, upgrade, and modernization of rail infrastructure" as a top priority on the railway sector, acknowledging that the development of the transportation system is imperative for sustainable growth in both society and economy. Also, the Presidential Decree No. PP-1446 "To promote the development of infrastructure and transport and communications construction (2011-2015)", which include "development and modernization of railway" as one of the top ten priority issues, came into force in 2010 as a plan to develop the transportation infrastructure.

As described above, the government of Uzbekistan has prioritized projects of improving infrastructure and transportation in its development strategy for sustainable growth at the time of appraisal and ex-post evaluation. The project is also considered relevant to its transportation sector policy and the Presidential Decree in which the government has consistently prioritized strengthening the transportation capacity and prompting railway development.

3.1.2 Relevance to the Development Needs of Uzbekistan

Uzbekistan, which is a doubly landlocked country, has made establishing the quickest route to oceans its top priority and targeted the development of a transportation route to the port of Karachi,

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

[3] ③: High, ② Fair, ① Low

Pakistan, from Termez via Afghanistan. At the time of appraisal, however, there was no direct route connecting Surkhandarya province, to which Termez belongs, and the neighboring Kashkadarya province, without traversing Turkmenistan. Moreover, it took more than 15 hours for customs clearance procedures at the border crossing and to traverse Turkmenistan, and the daily delay often hindered efforts to increase the reliability of transportation.

In recent years, the tonnage carried by freight trains has increased by 57% compared to before the project (2003), representing an increase in freight transport, thanks to economic growth in Uzbekistan and assistance to Afghanistan (Table 1). The volume of passenger transportation in 2012 was increased by only around 10% compared with before the project. A breakdown of the increase reveals a climbing trend in long-distance trains, and, in 2012, the volume of passenger transportation by long-distance trains have more than quintupled compared to that of 2003 (Refer to Table 2 and Local trains (Long distance) in Figure 2). This reflects a growing need in particular for long-distance trains.

The project line is a trunk line connecting the southern region of Uzbekistan and other regions, and has become an important transport route via Termez. There is therefore a considerable need for the project even at the time of ex-post evaluation.

Table 1 Railway Freight Volume

(Unit: Thousand Tons)

Year	2003	2011	2012
Volume	52,349	80,910	82,387

Table 2 Railway Passenger Volume

(Unit: Thousand Persons)

Year	2003	2011	2012
Number	16,061	16,401	17,828

Source: JICA (2013) "Data Collection Survey on Railway Electrification in the Republic of Uzbekistan".

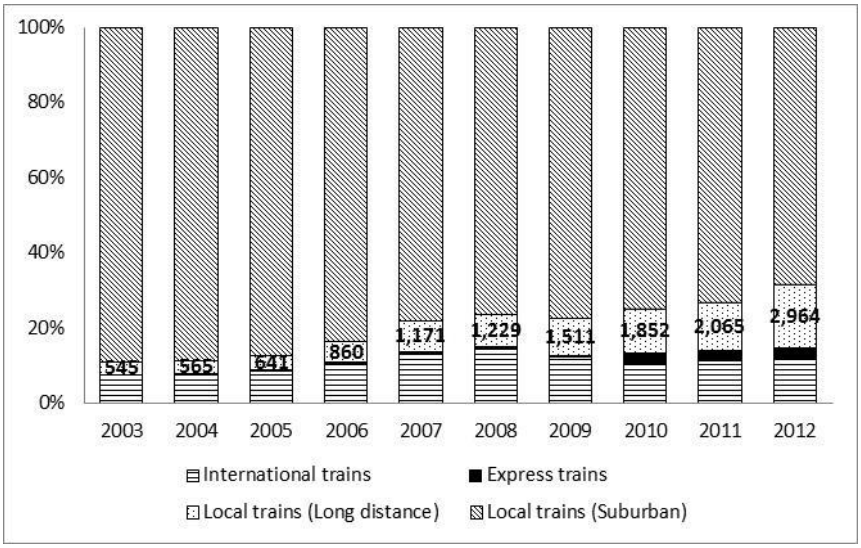


Figure 2 Railway Passenger Volumes by Train

Note: Numbers in the bar chart shows passenger totals for Local trains (Long distance).
Unit is thousand persons.
Source: JICA (2013) "Data Collection Survey on Railway Electrification in the Republic of Uzbekistan".

3.1.3 Relevance to Japan's ODA Policy

At the time of the appraisal, the policy of assistance to Uzbekistan[4] identified three priority areas, namely "1. Assistance for human resource and institutional development for economic and industrial development," "2. Regional development (Agriculture, education and healthcare)," and "3. Upgrade and maintenance of economic infrastructure (transportation and energy)". Among them, "3. Upgrade and maintenance of economic infrastructure (transportation and energy)" includes infrastructure development including the railway. Accordingly, the project is relevant to the Japan's ODA policy.

As described above, this project has been highly relevant to the Uzbekistan's development plan, development needs, as well as Japan's ODA policy. Therefore its relevance is high.

3.2 Effectiveness[5] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

3.2.1.1 Volume of Passenger and Freight Transportation at Project Line

As shown in Table 3, volumes of both passengers and freight have increased compared to the baseline. Although the volume of passengers was less than planned, the project achieved 88%[6] of the plan, and the expected effect was largely obtained. The increase in the volume of passengers and freight is attributed to the shift of transportation means from cars and buses to railway, partly because the project constructed new stations or lines which improved access to major cities in the southern region and neighboring countries where freight/passengers are transported, and reduced travel time and cost[7]. In addition, increasing freight in accordance with the reconstruction work in Afghanistan[8] was also considered as a contributing factor of such increase.

Table 3 Volume of passengers and freight transportation on target lines

	Baseline Year (2003) Baseline	Target Year (2012) Target	Completion Year (2012) Actual	Achievement level
Volume of passenger transported (Thousand passengers/year)	534	764	672	88%
Volume of freight transported (Thousand tons/year)	5,129	5,430	5,956	110%

Source: Data provided by the executing agency

[4] ODA Task Force Policy Consultation, July 2004.
[5] Sub-rating for Effectiveness is to be put with consideration of Impact.
[6] The actual volume of passenger transportation was 88% of the target partly because the hand luggage allowance became restricted to a maximum of 36 kgs. According to UTY, almost all passengers normally take huge amounts of luggage in Uzbekistan. Thus, a part of the passengers shifted the means of transportation from railway to cars due to the restricting the luggage allowance, which affect the actual volume of passenger transportation
[7] Based on interviews with UTY staff.
[8] Refer to 3.3.1.3. Establishment of regional transportation corridor as for the details of the freight transportation volume to Afghanistan.

3.2.1.2 Volume of Passenger and Freight Transportation at All Lines

The volume of passengers and freight transportation on all UTY lines at the time of ex-post evaluation achieved 150% and 112% of each planned target, respectively (see Table 4 below). According to the executing agency, the volume of passengers transported has been increasing on lines connecting tourist cities, such as Tashkent-Bukhara [9], Tashkent-Samarkand [10], and Tashkent-Urgench[11], which are not targeted in this project. However, the increase in tourists, thanks to railway service improvements such as launching the express service between Tashkent and Samarkand in 2011 as well as opening a new line under this project, is cited as one of the reasons for increasing the volume of passenger transported. Also the increased volume of freight transported on targeted lines, which accounts only for 7%[12] of the UTY total lines, are attributed to the increase in traffic volume associated with national economic growth, revitalization of the mining industry and the opening of large-scale new business (companies). Given that the targeted lines (223km) represent only 5% of all UTY lines (4,636km), the project is considered to contribute to a certain increase in the volume of freight transported.

Table 4 Volume of passenger and freight transportation on all UTY lines

	Original Year (2003) Baseline	Target Year (2012) Target	Completion Year (2012) Actual	Achievement level
Volume of passenger transported (million passenger km[note]/year)	2,077	2,285	3,438	150%
Volume of freight transported (million ton km[note]/year)	18,867	20,250	22,686	112%

Note: Million passenger km and million ton km are units showing the transportation amount. Passenger km shows an amount calculated by multiplying the number of passengers by the length (km) of the transportation, and ton km shows the tonnage of freight multiplied by the length (km) of the transportation.
Source: Data provided by the executing agency

3.2.1.3 Travel Time of Passengers and Freight Trains at Targeted Lines

The travel time of passenger trains on targeted lines at the time of ex-post evaluation (see Table 5 below) was 5.7 hours, which slightly exceeded the targeted time of 5.5 hours but drastically improved compared to 11 hours at the time of baseline survey. The travel time for freight trains was 7.2 hours, which was dramatically reduced from the baseline of 17.5 hours, and also achieved the planned target. The main reasons for such reductions in both travel times were the fact that the

[9] Bukhara was a prosperous cultural center not only in Central Asia but throughout the Islamic world until the beginning of the 20th century and many Islamic monuments remain. The old town of Bukhara was listed by UNESCO as a World Heritage Site in 2000.
[10] Samarkand is an ancient capital of Uzbekistan, referred to as the "blue city" due to its many blue mosques. In 2001, UNESCO added the city to its list of World Heritage Sites.
[11] There are many ruins of mosques and madrasas in Urgench. The city is also the main gateway to Khiva, which was listed by UNESCO as a World Heritage Site in 1991.
[12] Based on 2012 data, 7% was calculated by dividing the volume of freight transportation on targeted lines (5,956 thousand tons) by the volume for all lines (82,387 thousand tons).

travel distance was reduced by constructing new lines and eliminating the need for customs clearance[13] by bypassing Turkmenistan.

Table 5 Travel time of passenger and freight trains on target lines

	Original Year	Target Year	1 Year after Completion
	(2003)	(2012)	(2013)
	Baseline	Target	Actual
Travel time of passenger trains (hour)	11.0	5.5	5.7
Travel time of freight trains[14] (hour)	17.5	7.3	7.2

Source: Data provided by the executing agency

3.2.1.4 Number of Passenger and Freight Trains at Targeted Lines

As shown in Table 6, the number of passenger trains running between Tashguzar and Kumkurgan, the target line of this project, was 1,460 on a full-year basis at the time of ex-post evaluation, achieving 91% of the planned target. Under circumstances where the volume of passenger transported achieved 88% of the target (see 3.2.1.1 Volume of passenger and freight transportation on the project lines), the actual number of passenger trains was also slightly lower than the planned target, but almost achieved it. Meanwhile the number of freight train reached 94% of the planned target, which shows a decreased number of freight trains compared to the baseline year of 2003 though a certain number of freight trains were secured. In fact, the number of freight trains did not achieve the planned target, although the volume of freight transported exceeded the target (see 3.2.1.1 Volume of passenger and freight transportation on the project line). This was due to an adjustment in the number of trains and freight amount per cargo considering the operation cost. According to UTY, there was no change in operational plan or policy, and, although an increased number of trains is a desirable effectiveness indicator, the number of operating trains impacts on the financial aspects, namely the cost and benefit per operating train. Therefore, such increases are not always considered positive, with the cost/benefit performance of train operation in mind.

Table 6 Number of passenger and freight trains on target lines (year)

	Original Year	Target Year	Completion Year	Achievement level
	(2003)	(2012)	(2012)	
	Baseline	Target	Actual	
Number of passenger trains (year)	1,272	1,604	1,460	91%
Number of freight trains (year)	5,110	5,174	4,865	94%

Source: Data provided by the executing agency

[13] Before the project, customs clearance used to take about two to three hours when traversing Turkmenistan.
[14] Standing, accelerating, decelerating and replacing time is not included.

3.3 Impact

3.3.1 Intended Impacts

3.3.1.1 Improved Railway Transportation Service

At the time of appraisal, Turkmenistan had to be traversed when traveling or transporting items to a neighboring country or even within Uzbekistan or when traveling from southern provinces to other provinces. However, at the time of ex-post evaluation, travel time and distance had been reduced by taking lines newly constructed under this project. Consequently, the reliability of railway transportation was improved. For example, as shown in Table 7 below, the travel distance was shortened to nearest stations in neighboring countries from Karshi, an important hub of the railway network in Uzbekistan.

Table 7 Shortening of travel distance by new line

Section	Before Project	After Project
Karshi – Sariasia[Note 1] (km)	480 km	326 km
Karshi – Kumkurgan [Note 2] (km)	290 km	156 km

Note 1: The station near the border with Tajikistan
Note 2: The line connected to Termez (the city near the border with Afghanistan) via Kumkurgan
Source: Data provided by the executing agency

Reducing both the transportation distance and time helped improve the railway transportation service for customers. The result of the beneficiary survey[15] in ex-post evaluation also shows that 93% of respondents answered that they were "very satisfied" with railway transportation services upon completion of the project. Much improved accessibility to each destination is cited as the main reason (96%). In addition, more than 90% of respondents selected "very good" or "good" for the frequency of railway transportation services, reliable operation (frequency of delay), transit time and safety. More than 90% of respondents declared themselves satisfied with the current railway transportation services (See Table 8).

Table 8: Railway transportation services (based on the result of the beneficiary survey)

	Very Good	Good	Usual	Not Good	Bad
Frequency	85 %	11 %	4 %	0 %	0 %
Accuracy	76 %	22 %	2 %	0 %	0 %
Transit / Commute time	67 %	30 %	3 %	0 %	0 %
Safety	91 %	9 %	0 %	0 %	0 %
Satisfaction level	86%	7%	6%	0 %	0 %

3.3.1.2 Promoting the Development of Southern Region

This project was expected to have a certain impact on the economic development of the

[15] The summary of the beneficiary survey is as follows. Survey location: each station of the target lines (Kumkurgan, Tashguzar, Baisun, Darband, Termez and Dekhanabad). Survey respondents included passengers, residents living near railway stations and merchants. 132 people in total (male 98, female 34)

southern region by promoting the development of mineral resources. Industrial data by region was not available, but based on the gross regional product growth rates of the national average and target 2 provinces (Kashkadarya, Surkhandarya) obtained from publicized data, no increase in gross regional product was confirmed in the target area before and after implementing this project (See Figure 3).

Interviews with staff of the executing agency and railway station revealed that constructing the new line had created new employment at new stations and railway-related facilities and helped boost housing near new stations. During the construction of the new line and stations, factories producing minerals and chemicals decided to relocate nearer the station to ensure convenient transportation of their products and also reduce transportation costs. These factories started their operations to coincide with the opening of new stations and also contributed to the increase in the employment of local residents. Moreover, education, health and sport facilities were also constructed around the station for residents newly employed at new stations, railway-related facilities, shops and factories. These changes are considered to help revitalize neighboring societies and economies (The details are referred to in the【Box】).

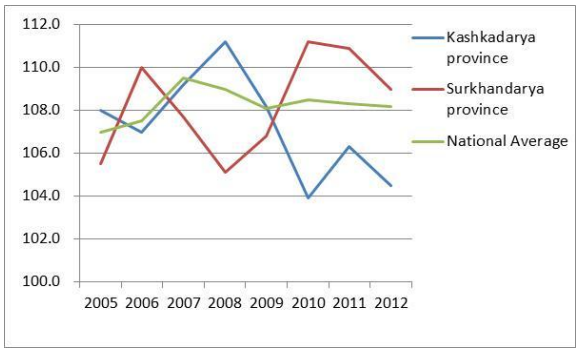


Figure 3: Gross regional product growth rate (year on year)

Source: Center for Economic Research, "Uzbekistan Economic Trends: Information and Analytical Bulletin for January – June 2013)

【BOX】Socioeconomic effects of implementing the "Tashguzar – Kumkurgan New Railway Construction Project"

Implementing the project had various socioeconomic effects on areas neighboring the newly constructed lines. Economic effects emerged in the form of about 5,100 new jobs over 3 years with the construction of the new line. Of that total, 2,000 people, including many local residents, worked as staff in regional offices of the executing agency, as staff at new stations, or as maintenance staff or assistant service staff of each station. Another 2,000 people were employed by factories or the related companies having relocated nearer the new stations, aiming to reduce the cost of transporting products during or after the construction of the new line. Following construction of residences for UTY or factory employees, commercial and sport facilities, physician's offices and schools, or other socially important infrastructure were constructed around the stations, which had been vacant land before the project implementation. Such development helped revitalize the regional economy and society.

For instance, with the increased number of residents around the newly constructed Darband station, a junior high school where 216 students studied at the time of ex-post evaluation was constructed with financial assistance from UTY, based on the discussion with the local authority. This new school is located in the center of neighboring four villages and allowed easy access from all villages compared to the old school, which involved some students who had to walk for one hour to commute. In another example, new sport facilities were also constructed next to Dehkanabat station. One of the major facilities, an indoor area, has 50 seats and provides recreational opportunities for residents, such as holding mid-size sporting events.

In the interviews, it was mentioned that building such facilities or holding these events would be impossible in this area if this project had not been implemented.

According to the executing agency, once ongoing electrification on the target line (new Japanese ODA loan "Karshi-Termez Railway Electrification Project") is completed, it is expected to increase the train speed, the number of operating trains and transportation volume, thereby further revitalizing the economy around the lines in future. Consequently, it is expected to expand the employment opportunities two times as many as mentioned above.

As described above, the new line have facilitated transportation of freight, and the residents around the target lines of this project considerably gained not only economic effects such as the construction of commercial facilities or the jobs created in railways and related facilities but also social effects such as improved access to educational, sport and health facilities.

Constructed School
near Darband Station

Constructed Sports Facility
near Dehkonobod Station

3.3.1.3Establishment of a Regional Transportation Corridor

The implementation of this project helped develop the national railway network. For instance, access has now been opened up to southern Surkhandarya province, which lacked any means of transportation to neighboring provinces in Uzbekistan unless detouring via Turkmenistan before the new line to Kashkadarya province was constructed.

At the same time, the new line enabled direct freight access to Afghanistan without traversing Turkmenistan, which led to an increase in freight transportation volume to Afghanistan from the country in 2012 as of the project completion, as shown in Table 9. This increase is considered attributable not only to the considerable needs for freight transported amid the reconstruction of Afghanistan but also reduced transportation time and cost by preventing the traverse of Turkmenistan.

Table 9: Volume of freight transported from Uzbekistan to Afghanistan

	No. of wagons		Volume of freight (tons)	
	2011	2012	2011	2012
Export	11,745	16,385	673,646	977,784
Transit	41,506	45,703	2,619,095	2,929,020
Total	53,251	62,088	3,292,741	3,906,804

Source: Data provided by the executing agency

At the time of ex-post evaluation, the "Karshi-Termez Railway Electrification Project" was ongoing under a new Japanese ODA loan, and the new line connecting Termez, a city near the border through to Mazar-e-Sharif in Afghanistan was also constructed with ADB aid. Along with the implementation of both projects, the regional transportation corridor would be utilized more efficiently in the future. This project provided a foothold for formulating the regional transportation corridor.

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

At the time of appraisal, "JBIC Guidelines for Confirmation of Environmental and Social Considerations" (April 2002) were applied and an environment management plan had to be formulated. The items on the right are specified environmental considerations, all of which were complied with in the project. Moreover, the predictive values for air, water, noise and vibration after the completion met the national criteria and there was no impact on the natural environment.

【Environmental considerations】
- During the period of construction works in late summer, animal breeding period should be considered.
- During the period of operation in riverbeds and floodplains of streams from summer to fall, it should be considered to ease negative impacts on hibernating mammals, reptiles, amphibians and spawning.
- Blasting in mountain areas from July to December should be conducted when the animals are not active.

Source: Documents provided by the executing agency

3.3.2.2 Land Acquisition and Resettlement

At the time of appraisal, resettlement of 62 households was expected. However, 136 households eventually resettled at the time of construction due to the change of access road. With the implementation of this project, the country's land use law and resettlement plan were explained to the targeted residents, whose understanding were obtained on condition that the project was implemented with the continuous collaboration of residents through information delivery and consultation meetings. Also based on the designated article[16], 1.1 billion sum was paid[17] to resettlement residents along with the construction of the new line. A series of processes was conducted in compliance with the designated articles of the country, and no issues emerged.

3.3.2.3 Unintended Positive/Negative Impact

(1) The increase in UTY income and foreign currency savings

The construction of the new line brought extra income for UTY, the executing agency, from the freight transportation charge between Kumkurgan and Termez, which was previously collected by

[16] Decree of the Cabinet of Ministries No. 97 (May 2006)

[17] The figure of 1.1 billion sum was equivalent to about 121 million yen based on the exchange rate as of the project appraisal (1 sum = 0.11 yen as of January 2004), which meant approximately 8.09 million sum (about 0.89 million yen) per house was paid. This was equivalent to the amount required to buy a 2LDK apartment in the capital city, Tashkent, at the time, and thus resettlement residents were paid sufficiently.

the national railway of Turkmenistan. The increased income totaled 56 million dollars for 2011 and 2012.

The construction of the new line also boosted foreign currency savings on customs duties and railway fares paid to the Turkmenistan government. According to estimates by the executing agency, these savings amounted to about 38 million dollars in 2011 and 46 million dollars in 2012, for a total of 84 million dollars.

By implementing this project, the volume of passenger and freight transportation on target lines has been increased, and the impacts were confirmed such as the improved national rail network, reduced transportation distance to neighboring countries, and improved railway services. This project has largely achieved its objectives. Therefore its effectiveness and impact is high.

3.4 Efficiency (Rating: ②)

3.4.1 Output

This project comprises 1) construction work of the new line, including rehabilitation of existing line, 2) construction of steel bridges, 3) installation of signaling and telecommunication works, 4) procurement of machinery for construction and maintenance and 5) consulting services. The comparison of the final output with the original plan is as follows in Table 10.

Table 10: Output plan and actual of this project

Item	Plan	Actual
1) Construction of a single-track railway line Tashguzar - Dekhanabad Dekhanabad - Baisun Baisun - Kumkurgan	 56.6 km 108.7 km 56.3 km	 57.2 km 110.6 km 55.6 km
2) Rehabilitation of existing track Karshi – Tashguzar	 31.0 km	As planned
3) Construction of steel bridge（B zone）	5 bridges	As planned (Design partially modified)
4) Signaling and telecommunication works Signaling Telecommunication works	 ・Installed in 17 new stations and operating control center (“OCC”) ・Telecommunication equipment installed in 17 new stations and OCC, fiber-optic and transmission system cables and trunk communication equipment installed in Marakand - Karsh－Tashuguzar－Kumkurgan	 As planned (Design partially modified)
5) Procurement of machinery for construction and maintenance Track materials Maintenance machinery	 ・R65 hardened rail, fastening devices, wooden sleeper, turnout ・Lining and tampering machine,	 As planned

	mechanized flat wagon	
6) Consulting services	a. Detailed design / bidding support / construction management b. Monitoring of progress status / proposing improvement strategy c. Financial statement of the executing agency during the project / audit report / review of business plan	As planned

Of Table 10, 1) construction work was almost performed as planned, and 2) rehabilitation of existing line, 5) procurement of machinery for construction and procurement and 6) consulting service were as planned. There was a difference in 1) length of the new line from the original length taken from the feasibility survey to the actual length determined after a geological survey. A portion of 3) construction of steel bridge and 4) installation of signaling and telecommunication works was changed, primarily for the following reasons:

- Design alteration for foundations of five steel bridges: Additional foundation works were required for all bridges. This alternation was unpreventable to secure safety (strength). Therefore, these changes are considered appropriate. (details of additional works were referred to in "3.4.2.2 project period").

- Design alteration for telecommunication works and aggregated electricity: Telecommunication works were also subject to changes in layout and design to respond to the increased demand and the requirement for safety. These changes are considered appropriate since they took place in response to the actual situation and did not affect the project effects.

Newly constructed station (Darband Station)

Installed communication equipment

Special Terms for Economic Partnership ("STEP") [18] were applied to this project. A

[18] STEP was introduced with a view to raising the visibility of Japanese ODA among citizens through technical transfer to recipient countries with best use of advanced technologies and know-how of Japan. Eligible countries are those eligible for Japanese ODA Loans and tied aid under the OECD rules. Projects eligible for STEP are those aiming for target sectors and fields of the scheme, and at the same time, those for which Japanese technologies and/or equipment are fully made use of.

questionnaire survey with UTY confirmed the high level of satisfaction with this STEP scheme because it enabled them not only to apply the Japanese ODA Loan conditions including a low interest rate and long-term repayment period but also to utilize advanced Japanese techniques as well as materials and equipment with high quality.

3.4.2 Input

3.4.2.1 Project Cost

The actual cost was 56,395 million yen (16,359 million yen from a Japanese ODA loan) while the original plan was 48,317 million yen (16,359 million yen from a Japanese ODA loan). Thus, the total project cost was slightly higher than planned (117%). This increased cost was due to additional works required to secure the strength of the steel bridge foundation under consideration of the current situation (details are referred to in 3.4.2.2 Project Period), and also due to inflation[19] and exchange losses[20] during the project. The project cost by Uzbekistan was increased to cover these changes. The project estimated a certain level of inflation and exchange losses but the changes during the project implementation exceeded the estimated values. In an interview survey with the executing agency, it was explained they perceived covering this loss by the Uzbekistan side as a huge burden.

3.4.2.2 Project Period

The project was scheduled to last for a total of 78 months, from October 2004 to March 2011. However, the project actually took 87 months, from October 2004 to December 2011, which was longer than planned (112%).

The main reason for the extension was the additional work required on the steel bridge foundation. Although the excavation depth was estimated at about 1 – 3m at the time of appraisal, troubles emerged when work started on fixing the foundation due to unsecure conditions caused by the waterbed with watery ground and large stones and rocks. Consequently, the excavation depth had to be up to 10m for each bridge, which required additional time and resulted in the project period being extended. However, this additional work was necessary for safety. Security was the prime concern when constructing the steel bridge. Under such circumstances, the project extension was considered reasonable.

3.4.3 Results of Calculations of Internal Rates of Return (Reference only)

Economic Internal Rate of Return (EIRR) and Financial Internal Rate of Return (FIRR) were

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The prime contractor shall be a Japanese company with tied, and subsidiary should be in the form of general untied. Conditions include that a minimum of 30% of the total contract amount, which is the subject of Japanese ODA Loan, should be financed to (i) goods and materials from Japan as well as services provided by Japanese companies or (ii) goods and materials from Japan only.

[19] According to UTY staff, increased reconstruction assistance to Afghanistan resulted in inflation for goods related to construction, even in Uzbekistan.

[20] The exchange rate at the time of this project appraisal was 1 sum=0.11 yen (1US$=108 yen). However, the rate at the time of project completion was 1 sum=0.04 yen (1US$=79 yen)

recalculated based on specific condition at the time of review[21]. EIRR was 11.8 %, as opposed to 5.5% at the time of appraisal and FIRR was 8.5 %, as opposed to 0.5% at the time of appraisal, meaning the results of both returns improved. The major reason for this improvement was because the actual value for GDP growth rates, which were used to calculated for the demand forecast for the volume of passenger and freight transported, exceeded the level of predicted forecast at the time of appraisal.

As mentioned above, both project cost and project period exceeded the plan. Therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspect of Operation and Maintenance

The operation and maintenance (O&M) of all lines, including target lines of this project, were supervised by the executing agency, UTY[22]. At the time of ex-post evaluation, UTY has 68,000 employees, working in individual functional departments of "Subdivisions servicing traffic process," "Enterprises implementing freight transportation and forwarding," "Repair and services enterprises," "Production, repair and construction infrastructure" and "Social infrastructure", as well as 6 regional railway branches which maintain each railway network and develop a maintenance plan. Of the target lines, the stretch from Tashguzar to Akrabat comes under the Karshi regional railway branch and from Akrabat to Kumkurgan is under the Termez regional railway branch.

A total of 671 O&M staff are assigned on the target line under the Karshi regional railway branch and 822 on the target line under the Termez regional railway branch. According to UTY and the staff at each station during site visits, both branches had secured sufficient staff to ensure adequate O&M. Other stations and regional railway branches also had sufficient staff and there were adequate relationships among each station, regional railway offices and UTY. Accordingly, no major problems were observed in terms of institutional aspects of O&M.

[21] EIRR - Cost: construction cost, O&M cost, Benefit: transportation cost reduction effect (passenger and freight trains), new demand, time-shortening effect (passenger trains), increased income from Tajikistan and converted demand from road, Project life: 40 years after completion
FIRR – Cost: construction cost, O&M cost, Benefit: increased income of cargo rate, Project life: 40 years after completion

[22] UTY is a government-owned company and there are no plans to privatize or sell stocks in the future (Draft Country Resolution, March 3, 2001. No. 108)

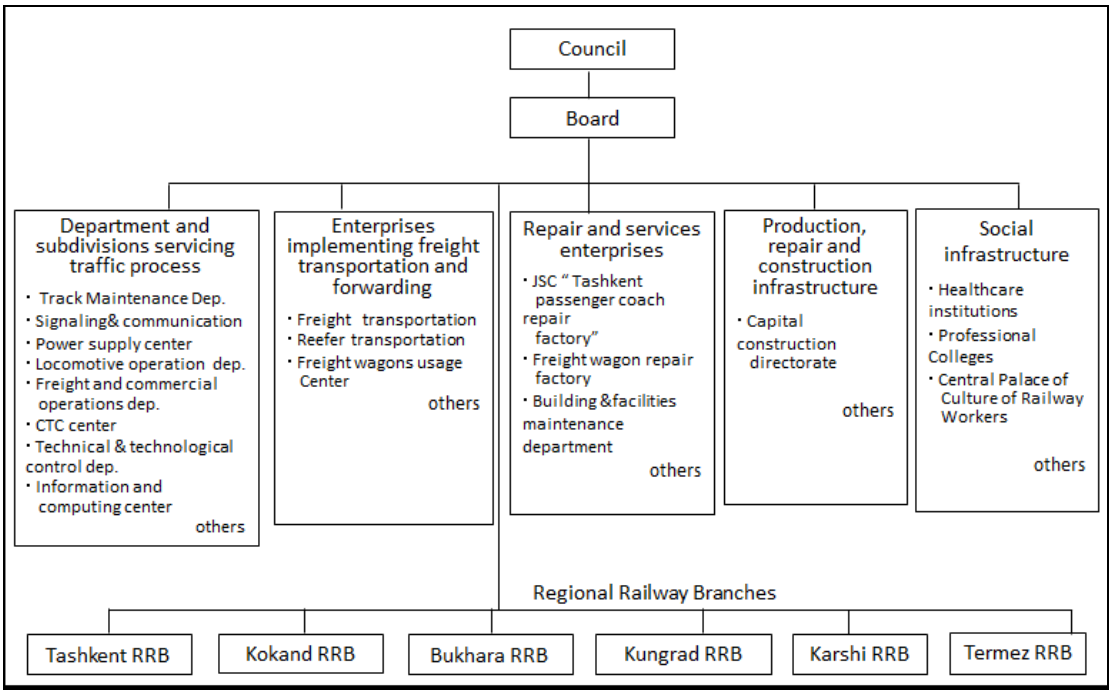

Figure 4 Organization Chart of UTY

Source: Document provided by the executing agency

3.5.2 Technical Aspect of Operation and Maintenance

UTY has a training center and holds technical training and maintenance retraining, which are scheduled by UTY annually, though the training frequency is not defined. The regional railway branch also holds maintenance and safety management training. Many staff learned basic railway knowledge of railway at Railway college or received a bachelor's degree in management or engineering at a Railway University. Accordingly, most staff have basic knowledge of infrastructure such as railway tracks, which is necessary for maintenance and management. Even outside the county, about 50 staffs have the opportunity to attend seminars[23] held in Russia every year. Under these circumstances, it is considered that UTY provides proper training opportunities for staff.

Accordingly, no major problems were observed in the technical aspects of O&M, as the executing agency holds regular training sessions and strives to maintain the technical capacities of staff.

3.5.3 Financial Aspect of Operation and Maintenance

At the time of ex-post evaluation, the O&M cost on the target line had increased every year (See Table 11), and the executing agency indicated there was no shortage in the O&M budget so far.

Based on financial data, the annual equity ratio, the net asset on the balance sheet, was 64% (2010), 67% (2011) and 70% (2012); showing relatively high ratios and an increasing tendency and

[23] Seminars including "traffic control management" "signaling and communication" "track facilities management" "railway transport management of high speed tracks" "maintenance and repair of tracks with the use of track machines" and "maintenance of signaling systems and communications in areas of high-speed track" were held.

indicates mid to long-term stability. Annual operational income is also increasing steadily, 385,061 million sum in 2010, 630,425 million sum in 2011 and 801,264 million sum in 2012. Those annual net incomes for these three years are 356,323 million sum, 582,206 million sum and 763,205 million sum respectively (See Table 12). Accordingly, the business continuity of the financial aspect is high.

Table 11: O&M cost of target lines under this project

(Unit: million sum)

2010	2011	2012
28,338.9	34,773.7	49,710.0

Source: Documents provided by the executing agency

Table 12: Financial data of UTY: Balance Sheet (left) and P/L Statement (right)

(unit: million sum)

	2010	2011	2012
Asset			
Current asset	785,148	1,059,027	1,360,830
Long-term asset	2,523,608	3,256,687	4,113,797
Total	3,308,757	4,315,715	5,474,627
Liability	1,189,473	1,444,906	1,621,083
Long-term liability	830,540	1,041,154	1,065,530
Others	358,933	403,752	555,552
Net asset	2,119,283	2,870,808	3,853,544
Total liabilities and net assets	3,308,757	4,315,715	5,474,627

(Unit: million sum)

	2010	2011	2012
Gross sales	1,631,493	1,998,463	2,704,403
Production cost	1,063,165	1,115,549	1,590,727
Gross income	**568,327**	**882,913**	**1,113,675**
Expenses for time period	252,247	330,615	409,576
Other operational expenses	68,981	78,127	97,164
Income from main activities	**385,061**	**630,425**	**801,264**
Non operating income	22,957	36,521	46,199
Non operating expense	37,873	62,713	56,764
Income before tax	**370,145**	**604,233**	**790,699**
Income tax and others	13,821	22,026	27,493
Total liabilities and net assets	**356,323**	**582,206**	**763,205**

Source: Document provided by the executing agency

Therefore, no major problems have been observed in the financial aspects of O&M.

3.5.4 Current Status of Operation and Maintenance

Tracks, steel bridges, signaling and telecommunication equipment and machinery are all operated well and in good condition. Train operation diagrams, staff allocations and detailed O&M plans for the new line constructed under this project were not determined at the time of appraisal but had to be determined when starting operation in 2011. All the items had actually been developed in 2007.

For the periodical maintenance of main facilities at the time of ex-post evaluation, tracks are checked for each zone by using specific equipment[24] on a daily basis and steel bridges are monitored by track maintenance staff of Dehkanabat, Chashmaihafizon, Akrabat and Darband station on a weekly basis. Signaling and telecommunication equipment is also checked periodically based on a prepared check sheet, though the frequency of the check varies depending on the equipment. A manual for maintenance items and maintenance activities is distributed to and used by each station. UTY also prepared a poster with graphs and pictures and promoted its active use, such as putting it on a wall.

[24] Equipment for track maintenance was provided as part of a technical assistance project for a Japanese ODA Loan.

Maintenance equipment for track

A maintenance poster attached to the wall (produced by the executing agency)

The target line of this project was a mountain railway traversing many steep pitches and curves, and the first railway line constructed in such area in Uzbekistan. In addition, a Japanese ODA loan project, the "Karshi-Termez Railway Electrification Project", started in 2012 to ensure the transportation capacity in response to increased demand, and it was expected to improve the technical ability of the executing agency, including the track maintenance and operational plan, in accordance with the construction and electrification of the new line. Under these circumstances, "Capacity Development on Upgrading Track Maintenance and Train Operations Skills related to Tashguzar-Kumkurgan New Railway Line" was implemented as a technical cooperation for a Japanese ODA loan from 2012 to 2013. During this project, training in 4 areas[25] was implemented to enhance the technical skills of the UTY staff. In an interview survey with the project trainees from UTY, it was explained that the timing of implementing training, after project completion and before the electrification project, was effective.

UTY, the executing agency that is responsible for maintaining the facilities and equipment of this project, has a proper organization to operate railway services and maintain facilities and equipment. The staff have opportunities to attend a series of maintenance training sessions. From this aspect, there are no major problems with the technical aspects of maintaining facilities and equipment. UTY also earns an adequate income and has no budget concerns for sustainability. Accordingly, no major problems were observed in the institutional, technical and financial aspects of O&M system. Therefore sustainability of the project effect is high.

4. Conclusion, Lessons learned and Recommendations

4.1 Conclusion

This project was implemented for establishing a more reliable and efficient railway transport network by constructing a new line between Tashguzar-Kumkurgan and rehabilitating the existing line

[25] 4 areas: "train operation planning", "track rectification planning", "track maintenance planning" and "electric locomotive maintenance planning".

between Karshi-Tashguzar and thereby helping promote the socioeconomic development of the southern region. Uzbekistan has worked to strengthen transportation capacity and promotes railway development for sustainable growth, meaning this project has been highly relevant to Uzbekistan's development plan and needs. Implementing this project increased the volume of freight and passenger transport not only for target line but also the whole line in Uzbekistan, and also reduced transportation time and distance and improved railway services by enabling internal travel bypassing neighboring countries. The socioeconomic impact around the target lines was also observed. Although the efficiency of this project is fair as both the project period and cost exceeded the plan, the sustainability of the project effect is expected to be assured since the project lines are in good operational and maintenance condition and there are no concerns over institutional, technical and financial aspects on the part of the executing agency.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

This project contributed to the establishment of a national railway network and improved access to neighboring countries. The electrification project for target lines under this project is implemented by JICA at the time of ex-post evaluation, which plans to connect the project line to a new line newly constructed by the executing agency between Termez and Mazar-e-Sharif in Afghanistan. Accordingly, it is expected to enhance the effect and impact of the project lines. In light of the above, it is important to ensure the implementation of an ongoing project and develop an appropriate operation plan that will meet the increasing demands.

4.3 Lessons Learned

- Calculating the estimated cost based on risks of exchange rate changes and inflation and the involvement of the executing agency in this process

  Under this project, the Uzbekistan government absorbed all project cost excesses which resulted from additional work on the construction of steel bridges, inflation and exchange losses. Though a certain level of inflation was estimated as of the project appraisal, exchange losses and inflation, which exceeded estimate, were incurred. According to UTY, this payment was considered a huge burden in the interview. In case of countries where prices and exchange rate largely fluctuate like Uzbekistan, a project should take careful note of contingency based on a review and discussion of the risks of exchange rate fluctuation and inflation with the partner country and executing agency.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs		
1) Construction of a single-track railway line		
Tashguzar - Dekhanabad	56.6 km	57.2 km
Dekhanabad - Baisun	108.7 km	110.6 km
Baisun - Kumkurgan	56.3 km	55.6 km
2) Rehabilitation of existing track		
Karshi – Tashguzar	31.0 km	As planned
3) Construction of steel bridge（B zone）	5 bridges	As planned (Design partially modified)
4) Signaling and telecommunication works		
Signaling	・Installed in 17 new stations and OCC	As planned (Design partially modified)
Telecommunication works	・Telecommunication equipment installed in 17 new stations and OCC, fiber-optic and transmission system cables and trunk communication equipment installed in Marakand-Karsh－Tashuguzar－Kumkurgan	As planned
5)Procurement of machinery for construction and maintenance		
Track materials	・R65 hardened rail, fastening devices, wooden sleeper, turnout	As planned
Maintenance machinery	・Lining and tampering machine, mechanized flat wagon	
6) Consulting services	a. Detailed design/bidding support/construction management b. Monitoring of progress status/proposing improvement strategy c. Financial statement of the executing agency during the project/audit report / review of business plan	As planned
2.Project Period	October 2004 – March 2011 (78 months)	October 2004 –November 2011 (87 months)
3.Project Cost		
Amount paid in Foreign currency	15,587 million yen	15,564million yen
Amount paid in Local currency	32,730 million yen (297, 545 million sum)	40,831million yen (1,020,775 million sum)
Total	48,317 million yen	56,395 million yen
Japanese ODA loan portion	16,359 million yen	16,359 million yen
Exchange rate	1 sum = 0.11 yen (As of January, 2004)	1 sum = 0.04 yen (Average between October, 2004 and December, 2011)