Ex-Post Monitoring Report of Japanese ODA Loan Projects 2011

Pacakage 1
(Indonesia, the Philippines, Sri Lanka Kazakhstan and Mongolia)

October 2012

JAPAN INTERNATIONAL COOPERATION AGENCY

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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 shall be enhanced.

This volume shows the results of the ex-post monitoring for ODA Loan projects that were mainly completed seven years ago and was given ex-post evaluation five years ago. The ex-post monitoring was entrusted to external evaluators to review the projects' effectiveness, impact, and sustainability, to follow up the recommendations made in the ex-post evaluation, and to make further recommendations for future sustainability.

The lessons and recommendations drawn from these monitorings will be shared with JICA's stakeholders in order to apply to the planning and implementation of similar ODA projects in the future.

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

October 2012

Masato Watanabe
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

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

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

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【Ex-Post Monitoring of Completed ODA Loan Project】

Indonesia

"Surabaya Urban Development Project (1)"

External Evaluator: George Terahara
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Field Survey: March- April 2012

1. Project Description

Map of the Project Area

Margomulyo Road

1.1 Project Objective

The project was to develop urban road, drainage, solid waste and water supply sub-sectors in the city of Surabaya in order to improve living environment, and thereby activate the regional economy and improve the welfare of local citizen.

1.2 Outline of the Loan Agreement

Loan Amount/ Disbursed Amount	11,251 million yen/10,893 million yen
Loan Agreement Signing Date/ Final Disbursement Date	February 1993/March 2004
Ex-post Evaluation	FY 2006
Executing Agency	DG. Cipta Karya, The Ministry of Public Works
Main Contractors	PT. Hutama Karya (Indonesia)/PT. Pembangunan Perumahan (Indonesia)/CV. Lanang Adhi Daya (Indonesia)/PT. Waskita Karya (Indonesia)
Main Consultants	Pacific Consultants International (Japan), IDEA Consultants (Japan), PT. Kartika Pradiptaprisma (Indonesia)

1.3 Background of Ex-post Monitoring

With an area of 332 km^2 and a population of about 2.76 million people (as of Year 2010), the City of Surabaya, the capital of the East Java Province, is the second largest city of Indonesia. Like other cities in Indonesia, Surabaya was not sufficiently equipped with necessary urban infrastructure. Aptly realizing those unfavorable circumstances and need for infrastructure development to provide the citizens with better living environment, the government of Indonesia was promoting a plan for improving the urban environment of the Surabaya metropolitan area in which the city of Surabaya occupies the center. The Ministry of Public Works decided to implement a part of a plan through ODA yen loan.

Ex-post evaluation conducted in March 2007 recognized high effectiveness in countermeasures for traffic volume increase, control of flood damage, improved garbage collection ability and increased water connection through expected appearance of results of this project. However, the project period was extended by complex factors brought about by the economic disturbance and high inflation from Asian Economic Crisis in 1997, the collapse of the Soeharto regime and consequent large-scale and frequent administrative changes at the central level as well as the regional levels. Finally, some components (Road: Kenjeran 1B and EMRR (Eastern Middle Ring Road) 2A (completed in April 2007), Water Supply: Pipe connection to East Side Ring Main have not been completed at the time of ex-post evaluation and a component (Water Supply: Wonocolo Pump Station) was not operational after completion and efficiency was evaluated as low. As some problems have been observed in terms of uncertainty of responsibility following the transfer of operation and maintenance control to a new system, sustainability of this project was judged as moderate. In light of the above, this project was totally evaluated to be moderately satisfactory. Furthermore, it was recommended to follow government regulations regarding land acquisition, to clarify management of operation and maintenance, to complete unfinished work early and to officially record flood damage.

Consequently, therefore, this project was selected for ex-post monitoring and reviewed under each criterion with the findings from the field survey and other research activities with a final conclusion being drawn.

2. Outline of Survey

2.1 Survey Schedule

Monitoring Period: January 2012- October 2012

Field Survey Period: March 21 - April 6, 2012

2.2 Constraints of Monitoring

The executing agency, DG. Cipta Karya (Directorate General of Human Settlement) of the Ministry of Public Works, did not setup monitoring and evaluation and did not have information and evaluation on the current situation of the project. At the time of appraisal, the Directorate

was assigned as the Executing Agency, and General Directorate of Roads and General Directorate of Water Resources were responsible to process procurement for the portion of urban roads and drainage under the national government. In addition, Surabaya City became substantive Principal Implementing Agency responsible for procurement and coordination for the subprojects under the city government. Thus, the monitoring mission requires visiting the City Planning Bureau (BAPPEKO, the former coordinating agency) and organizations, inclusive of national braches and local organizations, of four sectors and was limited in the efficiency of the survey. Consequently, a single responsible executing agency did not exist for the project as a whole.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

3.1.1.1 Indicators of Operations and Effects

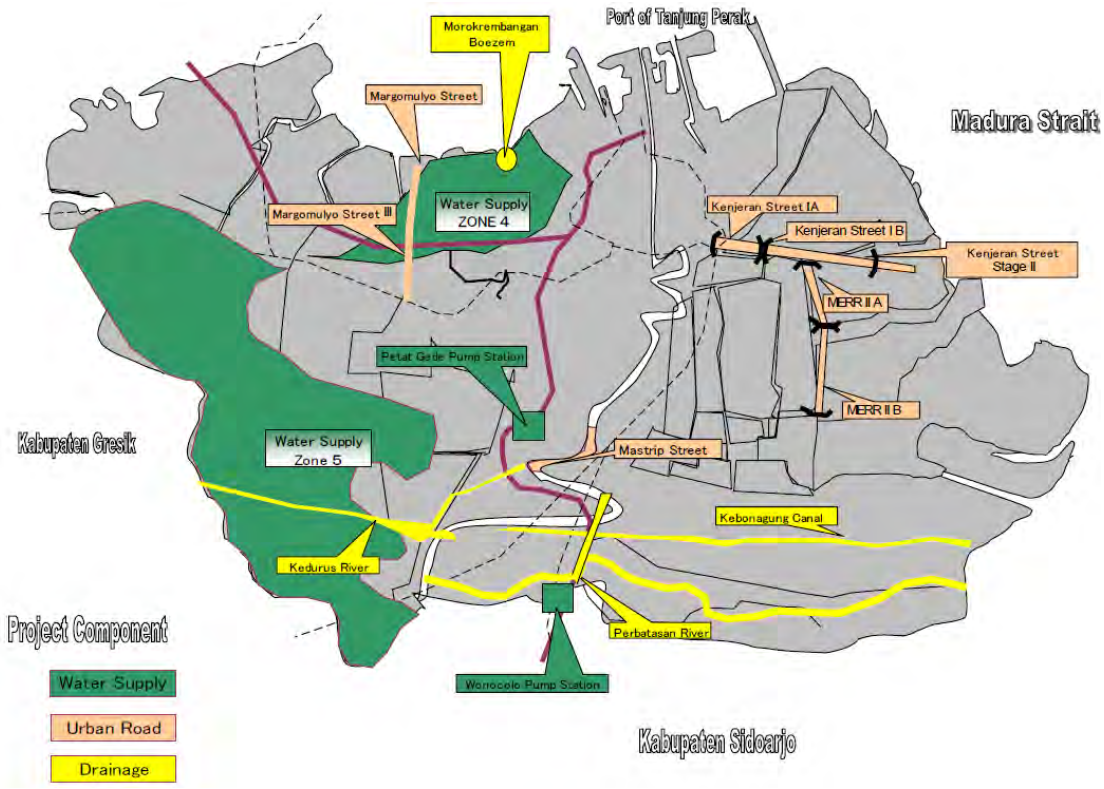
(1) Urban Roads

(a) Project Components

The project constructed the following six components on the four roads (See Figure 1. *The components in italic* show the unfinished parts at the time of ex-post evaluation)

1. Improvement of Kenjeran Road Stage 1, *1B* & 2 (7,590 m)
2. Improvement of Margomulyo Road Second Carriageway (1,700 m)
3. Improvement of Margomulyo Road Additional Work (200 m)
4. Improvement of Margomulyo Road 3 (3,254 m)
5. Construction of Eastern Middle Ring Road (EMRR) Stage *2A* & 2B (5,100 m)
6. Improvement of Mastrip Road 1 (3,209 m)

The total length is 5,100 m of new construction and 15,843 m of improvement (excluding unfinished section of Kenjeran 1B, 1,810 m)



Source: Ex-post Evaluation.

Figure 1 Location of Major Facilities under the Project

(b) In-service Situation

The following sections, which were not completed at the time of ex-post evaluation, have been completed and already been in service.

―Kenjeran Road Stage 1B was completed in 2010 and all sections have been in service.

―EMRR 2A section was completed in April 2007 and all sections came into service in 2009.

(c) Traffic Volume

Right Figure shows traffic volume on Mastrip and Margomulyo Roads. Mastrip Road can be compared with similar indicators of ex-post evaluation.

The volume in 2011 is more than ten times t
average daily traffic) and they are utilized sufficie
There are no official traffic volume counts on Kenjeran Road and EMRR.

(2) Drainage

(a) Project Components

The project constructed the following four components (See Figure 1).

1. Improvement of Perbatasan River (channel improvement: 14.3 km)

2. Improvement of Kebonagung Canal (channel improvement: 6.0 km, excavation of channel bed: 6.4 km)

3. Morokrembangan Boezem Improvement (total area of pond: 80.7 ha)

4. Remaining critical works of Kedurus River Improvement (Kedurus River channel improvement: 2.7 km and Kebonagung Canal and replacement of structures)

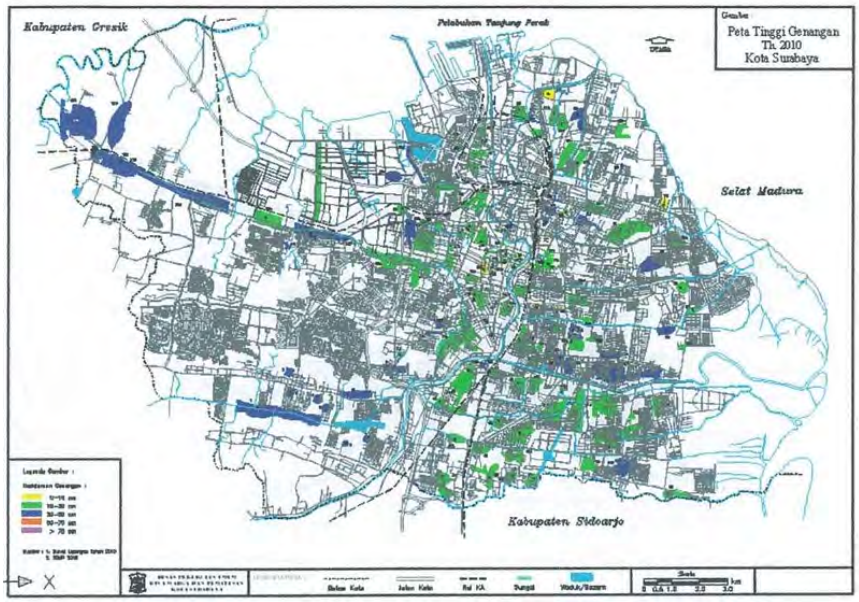
Total length of canal improvement was 29.4 km and total area of pond improvement was 80.7 ha.

(b) Occurrence of Flooding

Surabaya River has not experienced flooding since 2007. On the other hand, some areas have problems with inundation after rain (Figure 3). Because the drainage components of this project had the purpose to divert the upper flow of Surabaya River to the right bank, the components have performed with sufficient effectiveness against river overflow.

(c) Flooding Record

Public Works Department of the City has been keeping record of the flooding and inundation damage (Figure 3) since 2007. The recommendation by ex-post evaluation to keep a flood damage record was implemented.



Source: Public Works Department

Figure 3 Record of Flood Damage (2010)

(3) Solid Waste

(a) Project Components

The project procured equipment such as trucks and conducted civil work projects such as rehabilitation and construction of depot facilities. Table 1 shows the numbers of procured equipment and civil work projects and their current conditions.

Table 1 Procurement Numbers and Operational Condition

Item		Procured year	Count	Operational Number		
				2004 JICA Document	2007 Ex-post Evaluation	2012 Ex-post Monitoring
Equipment	Truck	1994-95	43	43	42	38
	Handcart	1994-96	280	0		
	Container	1994-96	219	0		
	Bulldozer	1994-95	2	In preparation 1 Disorder 1		1
	Excavator	1994	1	1		1
Civil Work Project	Construction of Solid Waste Depots	1994-95	9	9		9
	Construction of Temporary Disposal Sites	1994-95	19	19		19
	Rehabilitation of Solid Waste Depots	1994-95	31	31		31
	Rehabilitation of Temporary Disposal Sites	1994-95	44	44		44

Source: JICA Internal Document, Ex-Post Evaluation and City Department of Gardening and Cleaning.

(b) Operational Condition

Many trucks are currently operational (Table 1). According to City Department of Gardening and Cleaning, Surabaya City collected 271 thousand tons of solid waste in the City in 2010 and almost two thirds of it is collected by the trucks procured by the project. The procured trucks and constructed facilities are currently in use. Although the number of trucks decreased from the time of ex-post evaluation, the number of depots and temporary disposal sites did not change. Therefore, the project demonstrated effectiveness mostly at the same level as the ex-post evaluation.

(4) Water Supply

(a) Project Components

The project implemented the following eight components and location of major components is shown in Figure 1.

1. Transmission/primary/secondary water supply and distribution pipelines

(1) Wonocolo – Putat Gede

(2) Putat Gede – Demak

(3) Banyu Urip – Tandes

2. Secondary distribution (steel pipe) – Zones 4 + 5 (Total 415 km)

3. Pipe materials for reservoir sites

4. Tertiary distribution mains – Zones 4 + 5

5. House connections – Zones 4 + 5

6. Wonocolo Pump Station (not operational at the time of ex-post evaluation)

7. Putat Gede Distribution Facilities Installations

8. Takeover of the uncompleted IBRD portion

(1) Pipe installation connecting Wonocolo Pump Station to existing East Side Ring Main (ESRM) (uncompleted at the time of ex-post evaluation)

(2) Connection of missing portion of ESRM near Galaxy Mall toward Kenjeran Road

(3) Connection of missing portion of ESRM, Wadung Asli - Rungkut

(b) Current Situation of Uncompleted and Nonoperational Facilities

Through the completion of Karangpirang 3 Water Treatment Plant (not included in the project), Wonocolo Pumping Station, which was not operational at the time of ex-post evaluation, has been operational since 2009. Pipe installation connecting to existing ESRM has been completed and is operational.

(c) Realized Water Supply Capacity and Facilities

Table 2 shows the realized water supply and distribution capacity and facilities.

Table 2 Realized Water Supply Capacity and Facilities

	Unit	By this Project	Total (2011)	Portion of this Project
(1) Reservoir Capacity	m^3	13,000		
(2) Working Pump Capacity	Litter/sec	5,600		
(3) Stand-by Pump Capacity	Litter/sec	1,550		
(4) Primary Mains	m	31,955	137,700	23%
(5) Secondary Mains	m	68,070	622,500	11%
(6) Tertiary Mains	m	226,688	4,503,850	5%
(7) New House Connection	Household	60,000	397,040	15%

Source: Surabaya Regional Drinking Water Company (PDAM).
Note: New house connection is in 2010.

The project completed new pump station and primary to tertiary mains. This resulted in the 23% of total length of primary main and 11% of secondary mains in 2011.

(d) Number of Users and Water Usage Volume

Table 3 shows the number of water connection contracts and consumed volume. The number of contracts and volume increased significantly in the late 2000. Monthly water consumption per household is around 30 m^3 and does not change significantly.

Table 3 Water Connections and Consumed Volume

Year	1990	1995	2000	2005	2010
Household	116,251	175,863	248,491	312,297	397,040
Business	12,710	15,023	17,825	24,903	29,769
Industry	1,055	795	808	869	872
Social Activity	3,493	5,386	6,003	5,972	5,132
Governmental	1,716	898	948	1,131	1,201
Retail/ Tanker				--	--
Harbour	2	3	4	4	4
Off City	44	46	42	--	--
Losses				--	--
Total	135,271	198,014	274,121	345,176	434,018

Unit: 1,000m^3/yr

Year	1990	1995	2000	2005	2010
Household	42,507	64,720	83,103	110,961	132,145
Business	8,005	11,085	10,434	14,672	17,305
Industry	4,205	4,562	4,728	4,846	6,057
Social Activity	5,253	15,360	18,019	16,637	15,674
Governmental	9,368	5,209	7,585	6,197	6,270
Retail/ Tanker	303	480	112	105	11
Harbour	216	389	622	548	397
Off City	5,667	1,230	6,809		
Losses	48,924	50,096	79,862	92,762	89,793
Total	124,448	153,131	211,274	246,728	267,652

Monthly usage per household m^3	30	31	28	30	28

Source: PDAM.

Table 4 shows the industrial connections in Western Surabaya, where the project supplied water in Zone 4 and Zone 5, and Table 5 shows the household connections in the area.

Table 4 Industrial Connections in Western Surabaya (Zone 4 and 5)

Customer Category		Number of Customers		
Tariff Code	Category	1998	2005	2011
32a &32c	Small Enterprise	4,516	4,692	6,113
33	Small Industry		157	136
43	Large Enterprise		6,310	10,723
44	Large Industry		44	120
	Total	4,516	11,203	17,092

Source: PDAM.

In the water supply area of this project, the total number of industrial connections increased. The total number in 2011 increased by 53% from 2005 when the ex-post evaluation occurred. It can be said that this project contributed to the promotion of industrial location by corresponding to the water demand in the target area through the increase of water supply capacity.

Table 5 Household Connections in Western Surabaya (Zone 4 and 5)

Customer Category		Number of Customers		
Tariff Code	Category	1998	2005	2011
2a.2	Basic Household	2,884	62,533	2,715
3a	Modest Household	3,308	47,020	88,635
4a	Medium Household	80	23,802	55,710
4b.s	Large Household	138	14,565	38,818
3c.2	Luxury Household			8,079
	Total	6,410	147,920	185,873

Source: PDAM

Compared to 2005, the household connections in 2011 increased by 26% in number, and by 13% in volume.

Therefore, it can be said the water supply capacity development through this project contributed to improved sanitary conditions and urban development by corresponding to water demand of existing non-users and new residents.

3.1.1.2 Internal Rates of Return (IRR)

Although the ex-post evaluation did not calculate Internal Rate of Return (IRR), JICA internal documents partially did. Therefore, this paper re-calculated IRRs based on a similar method to the document and Table 6 shows the results.

EIRR and FIRR in the table mean the economic internal rate of return and the financial internal rate of return, respectively.

Table 6 Comparison of IRRs

Sector	Target of IRR	On Project Completion (2004)	Ex-post Monitoring (2012)	Major reason for difference
Drainage	Perbatasan River (EIRR)	16.1%	16.0%	The benefit by river improvement slightly decreased due to the minor population decrease in the target area.
	Kebonagung Canal (EIRR)	7.4%	7.3%	
	Morokrembangan Pond (EIRR)	16.7%	17.0%	The rate slightly increased due to minor increase of target population.
Solid Waste	Total solid waste (FIRR)	11.53%	3.4%	The rate decreased due to decrease of trucks and was unable to collect waste as expected.
Water Supply	Total water supply (FIRR)	8.2%	13.6%	On project completion, water consumption was assumed to be constant after completion. In fact, the water consumption increased.

Source: JICA internal document and this monitoring survey.

3.1.2 Qualitative Effect

Because the ex-post evaluation did not measure qualitative effects, this Monitoring Survey does not compare these.

Due to the above factors, the four infrastructure sectors of Surabaya City improved on the identified problems, such as uncompleted sections and non-operational facilities, made by ex-post evaluation. The uncompleted sections have been finished and are in service and the non-operational facilities started functioning after completion of facilities in a previous stage.

Furthermore, urban road users and water users are increasing and the effects of this project are more apparent compared to the time of ex-post evaluation.

3.2 Impact

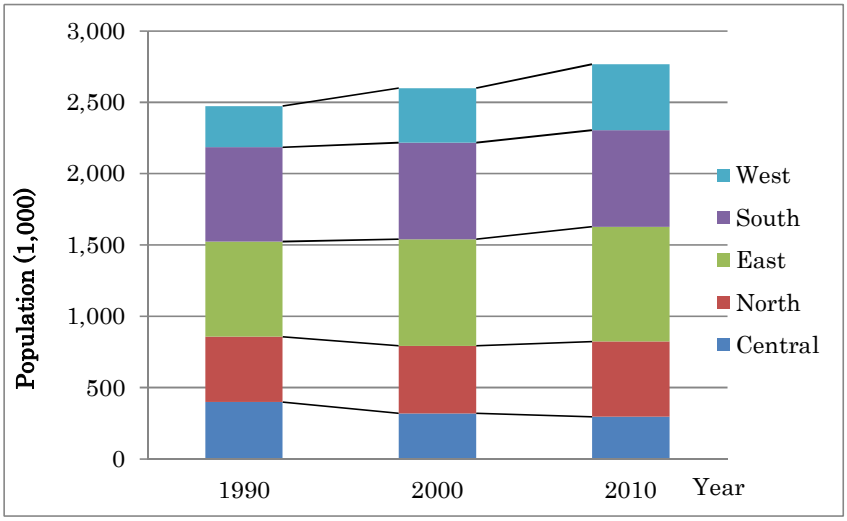
3.2.1 Intended Impact

3.2.1.1 Population Increase

By improvement and supply of various infrastructures, the total population of the city increased. Especially, its population increased in the West Ward, where the project improved water supply (Table 7 and Figure 4).

Table 7 Population Transition in Surabaya City

Ward	Area (sq.km)	Population (person)			Population Growth Rate (Annual %)	
		1990	2000	2010	1990-2000	2000-2010
Central	14.79	399,036	320,233	295,938	-2.2%	-0.8%
North	38.39	458,501	473,562	528,168	0.3%	1.1%
East	91.18	665,756	745,807	803,204	1.1%	0.7%
South	64.06	660,780	676,878	677,944	0.2%	0.0%
West	124.21	289,199	383,318	460,233	2.9%	1.8%
Total	332.63	2,473,272	2,599,798	2,765,487	0.5%	0.6%



Source: Surabaya in Figures 2011 and others.

Figure 4 Population Transition in Surabaya City

3.2.1.2 Activation of Economic Performance

In addition to the above population increase, Gross Regional Domestic Product (GRDP) in Surabaya increased by annual growth rates of 5% to 7% (Table 8). The economy of Surabaya has been growing steadily since 2000.

Table 8 Gross Regional Domestic Product of Surabaya City

Year	GRDP (Rp million)	GRDP/Capita (Rp thousand)	GRDP Annual Growth	GRDP/Capita Annual Growth
2000	50,301,846	20,574		
2006	68,817,057	25,659	5.4%	3.7%
2007	73,160,032	27,070	6.3%	5.5%
2008	77,717,874	28,537	6.2%	5.4%
2009	82,014,714	29,885	5.5%	4.7%
2010	87,828,842	31,759	7.1%	6.3%

Source: Surabaya in Figures 2011.

Note: 2000 Constant Price.

3.2.2 Other Impacts

3.2.2.1 Impact on Natural Environment

No specific impact has been identified.

3.2.2.2 Resettlement and Land Acquisition

UnevenNot smooth land acquisition of 109ha, which was required by three sectors except solid waste, delayed the implementation of the project and resulted in the low efficiency. Especially, the ex-post evaluation identified the prolonged negotiation process by Surabaya City because of ambiguity of the rights of residents who refuse eviction (Kenjeran Road) and calculation of the compensation amount including third-party (water supply facility). Later, according to BAPPEKO, Surabaya City became more careful in land acquisition for public works, such as interaction based on clear rules, frequent briefings for residents, and enhancement of the compensation system.

Based on the above factors, the project had impact on activation of urban economy in Surabaya City through economic infrastructure development, such as water and road, and improvement of urban environment.

3.3 Sustainability

3.3.1 Structural Aspect of Operation and Maintenance

During project implementation, the executing agency, DG. Cipta Karya, worked as an integrated supervisor over the multiple sectors, and it has not been involved in the project since completion. Then the agency had no information at the time of ex-post evaluation and ex-post monitoring. The agency is also not involved in operation and maintenance and the responsible organization is different for each infrastructure.

3.3.1.1 Urban Roads

The roads in Indonesia are classified into national, provincial and city roads by the functions of arterial, collector-distributor and city roads, respectively.

At the Feedback Seminar held at the time of ex-post evaluation in 2007, participants agreed that the Margomulyo and Mastrip Roads belonged to East Java Province and Kenjeran Road did to Surabaya City. In addition, although the participants did not explicitly confirm, they agreed that the EMRR belonged to national roads. Later, the Ministry of Public Works Decree Number 365 in 2009 decided the road administration as follows:

-Mastrip: Provincial Road

-Kenjeran, Margomulyo, and EMRR: National Roads

Although the agreement of Feedback Seminar was held for Mastrip and EMRR, Kenjeran and

Margomulyo changed to national roads. However, this is the decision of administrators and the operation and maintenance of each road category are set as follows in principal.

Table 10 Responsible Organization for Road Maintenance

Classification		National	Provincial	City
Administrator		Ministry	Province	City
Operation and Maintenance (Example)	Cleaning/Street Light/Gardening	City Dept. of Gardening and Cleaning		
	Emergency Repair (Emergency, Pothole)	City Dept. of Roads and Bridges		
	Routine Repair (Patch, Pothole)	Road Executing Agency	Provincial Public Works Dept.	City Public Works Dept.
	Heavy Maintenance (Overlay, Expansion)			

Source: Monitoring Survey.

Under the Ministry of Public Works, the Road Executing Agency Area 5 (*Balai Besar Palaksanaan Jalan* Area 5) is conducting routine maintenance of national roads with the city.

Road and Bridge Maintenance Division, Road and Bridge Department of City holds 20 staff and 50 workers, inclusive of outsourcing, are regularly engaged in road maintenance operation.

3.3.1.2 Drainage

Brantas River Basin Management Office (*Balai Besar Wilayah Sungai (BBWS) Brantas)* under Ministry of Public Works is maintaining the drainage. BBWS has 526 civil servants and 345 outsourced workers and 60 civil servants and 17 outsourced workers are engaged in drainage maintenance.

Among drainage maintenance, Drainage Department of City also works for dredging and removal of aquatic plants and operation of pumping stations. If BBWS has sufficient budget, it is prioritized. Next to it, the city budget is to be expended. Drainage Department of City has six civil servants and 375 outsourced workers responsible for operation and maintenance.

3.3.1.3 Solid Waste

Surabaya City Department of Gardening and Cleaning is operating and maintaining the vehicles and facilities procured by this project. The Department has 621 civil servants and 71 outsourced workers.

3.3.1.4 Water Supply

Surabaya Regional Drinking Water Company (PDAM) is responsible for the implementation of the components in water supply sector of this project and operation and maintenance. Distribution Maintenance Departments are organized for each eastern and western zone taking charge of respective operation and management tasks

Therefore, the responsible organization is clarified for operation and maintenance by each sector and there is no particular problem.

3.3.2 Technical Aspect of Operation and Maintenance

3.3.2.1 Urban Roads

City department has no clear technical classification for maintenance staff and technical capacity cannot be confirmed. City outsources some maintenance operation and outsourced companies are conducting training.

3.3.2.2 Drainage

Removal of aquatic plants and canal dredging are the main task of operation and maintenance. BBWS and City department are conducting training for both civil servants and outsourced staff.

3.3.2.3 Solid Waste

The City department conducts training for permanent staff on solid waste depots.

The department also trains garbage truck drivers when they start their jobs.

3.3.2.4 Water Supply

When new pump operators are recruited, PDAM conducts training to them based on manuals prepared by pump makers. PDAM's Distribution Maintenance Department conducts training of its staff for daily maintenance of water pipes.

By these facts, it is confirmed that a certain level of training has been conducted but it is not sure that the technical level has been sufficiently achieved to the current required standard including outsourced staff.

3.3.3 Financial Aspect of Operation and Maintenance

3.3.3.1 Urban Roads

The City has annual budget for road maintenance of Rp. 20 billion. It is judged that the scale of this budget is sufficient for the responsible maintenance operation. However, the maintenance cost may rise as the traffic volume increases.

3.3.3.2 Drainage

There has been no user charge for drainage. The BBWS expends Rp. 450 million annually for three components under the project. BBWS is a national organization and the budget is secured from the national budget. The maintenance cost, however, may increase as a result of the progress of urban development and other factors.

3.3.3.3 Solid Waste

The City collects monthly Rp. 500 from low income households and Rp. 12,000 from other households per household for solid waste discharge (Mayor Regulation 57/2001). Although total amount collected is not clear, the amount is below initial estimation. The shortage is covered by City budget according to Department of Gardening and Cleaning. However, the recycling activity is not so active that waste discharge may increase in future resulting in an increase in financial assistance from the city.

3.3.3.4 Water Supply

PDAM reported that the operation and maintenance cost for each facility is not clear, but its revenue comes from water usage and the financial standing of PDAM is good.

3.3.4 Current Status of Operation and Maintenance

3.3.4.1 Urban Roads

During field survey, it was observed that the roads were maintained in good condition. The road sections under this project have high traffic volume but there is no problem with road surfaces. However, some sections have not been swept properly.

3.3.4.2 Drainage

BBWS conducts removal of aquatic plants and cleaning twice a year. The target areas of the project are maintained in good condition. BBWS conducts dredging as necessary.

3.3.4.3 Solid Waste

During field survey, it was observed that the facilities and trucks are maintained in good condition.

3.3.4.4 Water Supply

During field survey, it was observed that the pump stations and pipes are maintained in good condition.

Photo 1 Urban Road: Kenjeran Road

Photo 2 Drainage: Kubong Agung Canal

Photo 3 Solid Waste: Garbage Truck

Photo 4 Water Supply: Wonocolo Pump Station

Therefore, although there is no involvement of the executing agency, the responsibility of operation and maintenance of each component of this project is clearly defined by each organization by sector. The City's responsible area has expanded from the time of appraisal. There is no specific concern in structural aspects of sustainability because Surabaya City and other organizations clearly implement each responsibility and prepare maintenance budgets accordingly. On the other hand, the sectors supported by national and city budget, especially urban roads, drainage and solid waste, hold risks which endanger financial sustainability through the increase of cost and deterioration of financial balance.

4. Conclusion, Recommendation and Lessons Learned

4.1 Conclusion

Uncompleted sections and non-operational sections after completion at the time of ex-post evaluation have been in service and used effectively. There is no particular problem in operation and maintenance structure because responsible organizations are currently clearly defined. The recommendations by ex-post evaluation are steadily implemented in the clarification of road operation and maintenance organization and record keeping of flooding and inundation.

4.2 Recommendation

Not applicable.

4.3 Lessons Learned

The system of local governance in Indonesia greatly changed from the time of appraisal to the present. Especially, the Decentralization Law (1999) and its revision in 2004 expanded the responsible area of cities and influenced the project. Therefore, for future projects, not limited to Indonesia, it should be considered that the proper implementation structure, such as setting a local government as an executing agency or involvement of a local government from an initial stage, depending on the situation of roles between national and local governments and project contents for multi-sectorial infrastructure projects in specific areas. This will facilitate the project implementation and follow-up.

Comparison of Planned and Actual Scope

Item	Planned	Actual
1.Output		
Urban Roads	・Construction of EMRR I ・Improvement of Kenjeran Rd. ・Improvement of Banyu Urip Rd. ・Improvement of Margomulyo Second Carriageway ・Construction of (EMRR II) & Bridge Total Length Construction 15,265 m Improvement 10,720 m	・Construction of EMRR ・Improvement of Kenjeran Rd. ・Improvement of Margomulyo Rd. ・Improvement of Mastrip Rd. Total Length Construction 2,850 m Improvement 15,843 m
Drainage	・Improvement of Perbatasan River ・Improvement of Kebonagung Canal Total canal length: 26.8 km Total pond area 28 ha	・Improvement of Perbatasan River ・Improvement of Kebonagung Canal Total canal length: 29.4 km Total pond area: 80.7 ha
Solid Waste	・Collection equipment (Trucks etc.) ・Landfill equipment	・Collection equipment (Trucks etc.) ・Landfill equipment ・Civil work projects
Water Supply	・Transmission/Primary/ Secondary Water Supply and Distribution Pipelines ・Secondary Distribution (steel pipe) ・Pipe Materials for Reservoir ・Tertiary Distribution Mains ・House Connections ・Wonocolo Pump Station ・Putat Gede Distribution Facilities Installations	・Mostly as planned with difference in quantity ・Takeover of the uncompleted IBRD portion -Pipe installation connecting Wonocolo Pump Station to existing ESRM -Connection from ESRM to Keneran Rd -Connection of uncompleted ESRM portion to Wadung Asli - Rungkut
2.Period	February 1993- March 2001 (8 years one month)	February 1993- March 2004 (11 years and one month with some portion uncompleted)
3.Cost Foreign Currency Local Currency Total (Japanese ODA Loan Portion) Exchange Rate	 4,959 million yen 10,643 million yen 15,602 million yen 11,251 million yen Rp. 1= 0.064 yen (as of 1992)	 (Breakdown is unavailable between foreign and local currency portions.) 13,196 million yen 10,893 million yen Rp. 1= 0.017 yen (simple average during 1994 - 2004)

【Ex-post Monitoring of Completed ODA Loan Project】

The Philippines

"Nationwide Air Navigation Facilities Modernization Project Phase III"

External Evaluator: George Terahara
(International Development Center of Japan Incorporated)

Field Survey: April 2012

1. Project Description

Map of the Project Area

Laoag Control Tower

1.1 Project Objective

The project's objective was to enhance the safety of air traffic services by developing air navigation facilities nationwide, and thereby contribute to an increase in air traffic and growth of the air industry in the Philippines.

1.2 Outline of Loan Agreement

Loan Amount/ Disbursed Amount	6,386 million yen / 6,203 million yen
Loan Agreement Signing Date/ Final Disbursement Date	August 1995 / June 2004
Ex-Post Evaluation	FY 2006
Executing Agency	Air Transportation Office of Department of Transportation and Communication (DOTC-ATO) ((Current) Civil Aviation Authority of the Philippines (CAAP))
Main Contractor	TOMEN Corporation ((Current) Toyota Tsusho Corporation) (Japan)
Main Consultant	Japan Airport Consultants (Japan)

1.3 Background of Ex-post Monitoring

Before 1992 the traffic volume of the Philippines' aviation sector had remained stagnant due to political turmoil and economic recession. However, traffic volume has been increasing since 1992 as a result of population growth and economic development, as well as the introduction of larger aircraft with improved performance and the building of new airports. Under these circumstances, the government of the Philippines has been striving to promote the development of air navigation facilities based on a master plan on air navigation aid.

In 1978, the Air Transportation Office of Department of Transport and Communication (DOTC-ATO) implemented the Nationwide Air Navigation Facilities Expansion Project (Phase I) with an ODA yen loan. As part of the Phase I project, DOTC-ATO developed a long-term modernization program. In 1986, after reviewing its modernization program, DOTC-ATO implemented the Nationwide Air Navigation Facilities Modernization Project – Phase II. As part of the Phase II project, DOTC-ATO developed the Financial and Technical Management Study, a plan for years 1990 to 2000. Based on the criteria established in the study, the project reviewed the implementation of development projects for air navigation facilities that were being carried out with assistance from other donor countries and prepared the demand forecast for the Civil Aviation Master Plan (CAMP). DOTC-ATO then prepared the implementation plan (I/P) for this Phase III project and concluded an ODA yen loan contract for the project in 1995 to develop air navigation equipment.

Ex-post evaluation of this project recognized the high effectiveness because of expansion of the coverage of air-ground radio communication (areas where pilots and air traffic controllers can talk using radios) and better guidance control through improved sensitivity with introduction of state-of-the-art high-precision equipment. However, the project period greatly exceeded the planned period (220% of planned period); therefore the evaluation for efficiency was low. Despite some problems including lack of spare parts and an insufficient operation and maintenance budget, sustainability of this project was judged as moderate. Consequently, the total evaluation rating was satisfactory. In addition, ex-post evaluation recommended to the executing agency to secure sufficient budgets, develop a system for the provision of spare parts and enhance the equipment repair system.

Consequently, the project became subject to Ex-post Monitoring in order to review and verify the current conditions from the ex-post evaluation onward. The project was reviewed with distinct evaluation criteria, especially focused on sustainability, based on the results of the field survey and others and a conclusion was derived.

2. Outline of Survey

2.1 Survey Schedule

Monitoring Period: January 2012 - October 2012

Field Survey Period: April 7 - April 19, 2012

2.2 Constraints of Monitoring

None

3. Monitoring Results

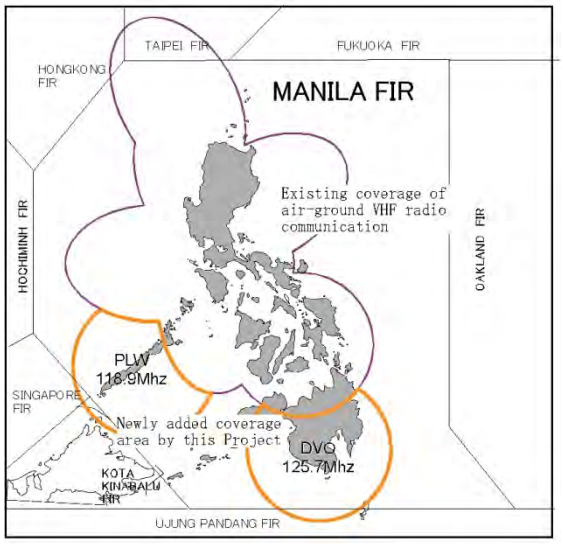
3.1 Effectiveness

3.1.1 Quantitative Effects

3.1.1.1 Indicators of Operation and Effects

(1) Expansion of Coverage by Air-ground Radio Communication

Figure 1 shows the Manila Flight Information Region (Manila FIR) and coverage by air-ground radio communication by Very High Frequency (VHF) radios. Manila FIR covers an area of approximately 3 million km^2 and VHF radio covered an area around 1.2 million km^2 before the project. The introduction of high precision state-of-the-art equipment[1] with VHF radios improved communication sensitivity and reduced errors. In addition, communication facilities in Palawan (PLW in Figure 1) and Davao (DVO in Figure 1) developed by this project expanded the coverage by 430 thousand km^2.



Source: Prepared based on CAAP data

Figure 1 Manila FIR and Air-ground Radio Communication Coverage

Total air-ground radio communication coverage area did not change from the time of ex-post evaluation in 2006. Thus, the effectiveness of this project was continuously sustained.

(2) Improvement of Safety and Reliability (Aircraft Accident Count)

There has not been an accident involving large aircraft with more than 100 fatalities since 2000 and air transport safety has been improved.

Specifically, most recent accidents in these ten years are caused by general aviation[2] and there has not been an accident due to miss-operation of air traffic control.

[1] These facilities are mainly (1) En-Route Air Traffic Control Facilities and (4) Terrestrial Communication Facilities on the attached Table in the last page.

[2] General Aviation is flight operations by small sized aircraft for non-business air transportation.

Table 1 Transition of Aircraft Accident Count

Year	1980	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
Accident	1	0	2	1	2	0	1	3	0	3	4	0	0	1	0	1
Fatalities	2	0	4	0	4	0	4	67	0	8	40	0	0	0	0	0

Year	1996	97	98	99	2000	01	02	03	04	05	06	07	08	09	10
Accident	3	1	2	4	1	0	2	1	2	2	2	2	1	5	1
Fatalities	0	2	107	18	131	0	19	3	2	0	0	0	0	11	3

Source: Aviation Safety Network; (http://aviation-safety.net)
Note: Excluding criminal act such as hijacking and military operations.

3.1.1.2 Internal Rate of Return (IRR)

Ex-post evaluation did not calculate the internal rate of return and this monitoring survey does not as well.

3.1.2 Qualitative Effects

Because the ex-post evaluation did not measure qualitative effects, this Ex-Post Monitoring Survey does not compare them.

Based on these facts, the effectiveness of this project appears in the coverage of VHF radio and improvement of safety and reliability at the same level as the ex-post evaluation.

3.2 Impact

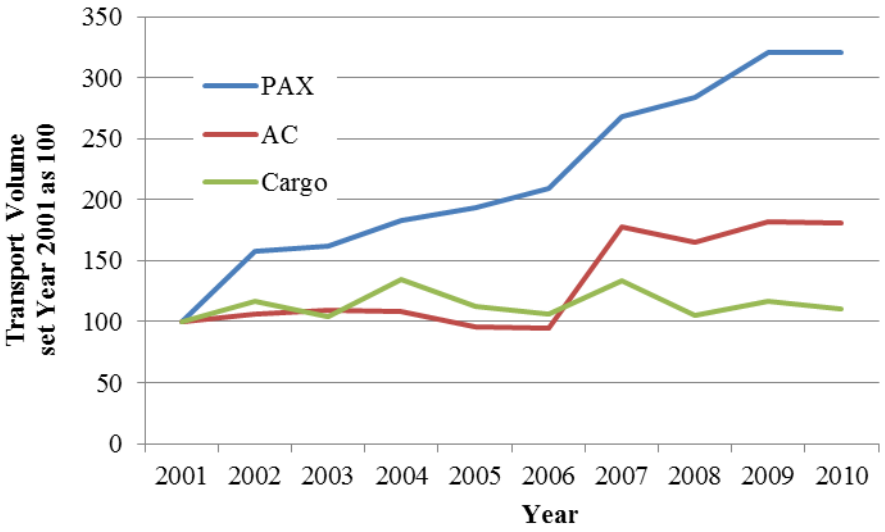
3.2.1 Intended Impact

3.2.1.1 Increase in Air Transport Volume

By introduction of new air navigation facilities[3] of this project, existing airways can be operated more efficiently and new airways were prepared. Therefore, airway capacity expanded and air transport volume increased.

Figure 2 shows the air transport volumes of passengers (PAX), aircraft movement (AC) and cargo (Cargo) from 2001 through 2010 by setting the value of year 2001 as 100. Comparing the values in 2010 to those in 2001 (value of 2010 / value of 2001), number of passengers, aircraft departures and arrivals and cargo transport values are 321%, 181% and 111% respectively.

[3] These facilities are mainly (1) En-Route Air Traffic Control Facilities (3) Air Navigation Facilities and (4) Terrestrial Communication Facilities on the attached Table in the last page.



Source: CAAP

Figure 2 Transition of Air Transport Volume

Thus, the total number of passengers using airports in 2011 increased to 40.86 million, which is more than three times the number in 2001. The number of aircraft departures and arrivals increased gradually and passengers per aircraft seemed to increase. Looking at the numbers by airport, especially Kalibo Airport was used by 5.2 times as many passengers in 2011 as in 2001. This is due to the increase in visitors attracted by tourism development in the surrounding area.

3.2.1.2 Conformance to International Standards (Consistency with ICAO standards, etc.)

The Civil Aviation Authority of the Philippines (CAAP) is working to conform to the International Civil Aviation Organization (ICAO) standards. However, ICAO does not certify the conformance and does not rank airports and air traffic control. According to CAAP, CAAP prioritizes the budget allocation and participates in international conferences to meet ICAO standards, but they have yet to achieve the needed results.

In 2008, Federal Aviation Authority (FAA) of the United States of America downgraded the overall aviation sector of the Philippines from Category I to Category II. It means that the FAA recognized some deviation from ICAO standards.

On the other hand, the European Union (EU) has banned all Philippine airlines from flying to the European region for safety reason. It is effective as of April 2012.

According to CAAP, all FIRs adjacent to Manila FIR introduced ADS/CPDLC[4] and only Manila FIR has been left behind[5].

By these reasons, the Philippine airline companies have limitations to expand their business in the international market and air traffic control in Manila FIR lagged behind even in

[4] Automatic Dependent Surveillance and Controller- Pilot Data- Link Communications

[5] Introduction of ADS/CPDLC is beyond the scope of this project.

comparison with adjacent FIRs.

3.2.2 Other Impacts

3.2.2.1 Impact on Natural Environment

CAAP recognized no special impact on natural environment.

3.2.2.2 Resettlement and Land Acquisition

The project acquired new land for construction of control towers and communication facilities. This land had been used for agricultural use and no resettlement took place. Although it took some time to acquire land in Baguio, Laoag and Kalibo, this has been resolved not by compulsory acquisition but by negotiation and there is no problem currently.

Therefore, this project has had certain impact on expansion of the air transport industry in the Philippines by improvement of air transportation safety and expansion of airway capacity.

3.3. Sustainability

3.3.1 Structural Aspect of Operation and Maintenance

In March 2008, the Air Transportation Office of Department of Transportation and Communication (DOTC-ATO or ATO) was transformed into the Civil Aviation Authority of the Philippines. This meant the organization changed from a government department to an independent authority. The difference from the ATO was assumed that CAAP had “fiscal independency,” which enabled CAAP to allocate their revenue for their operations by their decisions. After the reorganization, there was no change in the department names and division of duties and Airways Navigation Service (ANS) has been operating and maintaining the air traffic control system. Air traffic controllers belong to Air Traffic Service (ATS).

In 2012, ANS requires 760 regular staff but employs only 528. Staff shortage is covered by continuous shift duty and overtime. At the time of transformation, the new CAAP management promoted voluntary early retirement with a retirement package which caused staff shortages. On the other hand, CAAP is recruiting new graduates, but it is difficult to fulfil the regular staff requirements quickly because of strict qualification standards and longer initial training. Staff shortage, however, does not influence the operation.

Based on ICAO standards, ANS operates and manages the air navigation aid system, radar, meteorological and communications equipment. ANS maintains airport air traffic control facilities based on operational hours of each airport, and air navigation aid systems such as VHF Omni-directional Range (VOR) and Distance Measuring Equipment (DME) by three round-the-clock shifts on the ground.

Although ICAO standard requires calibration of VOR and DME from the air, the calibration has not been conducted since October 2010 because of aircraft failure for aerial inspection.

CAAP will try to outsource the inspection within the year 2012 to a private air charter.

Photo 1 VOR/DME

(Photo 1 and 2 in Laoag Airport)

Photo 2 VOR/DME Maintenance

ANS staff at each airport conducts regular operation and maintenance of equipment based on daily, weekly, and monthly routines. If a problem is found, Operations Department of ANS headquarters deals with it and the defective parts sent to Manila Maintenance Center (MMC) for repair work. Field survey found there is no serious problem with regular maintenance as routine logs are kept properly. In addition to communication equipment, ANS is also responsible for facility management.

3.3.2 Technical Aspects of Operation and Maintenance

ANS has two major fields of engineers: Communications Navigation Systems (CNS) Officers and Airfield Lighting and Power Technician. The former is classified into five ranks and the latter into four ranks by each technical level and corresponding training is conducted. Air Traffic Service has two fields of specialists: Air Traffic Controller, ATS-319, and Airways Communicator, ATS-205. Air traffic controllers and airways communicators are checked based on three themes of training and examination for airport and approach as well as medical testing.

"Educational Support for the New CNS/ATM Systems Implementation Project in the Philippines (JICA Technical Cooperation Project, 2004-2008)," "Capacity Development Project for Improvement of Safety and Efficiency for Air Navigation System (JICA Technical Cooperation Project, 2009-2014 (Scheduled), On-going)," and "New CNS/ATM Systems Development Project (JICA Loan Project, L/A in 2002, On-going)" are to introduce a more advanced air navigation system which requires the use of satellite. However, as of April 2012, it is not clear when this navigation system will be introduced completely. Even after the completion and introduction of New CNS/ATM, the necessity and effectiveness of equipment introduced by this project will not change. If operation and maintenance of equipment by the project are not performed properly, the equipment may not function correctly for air traffic safety.

3.3.3 Financial Aspect of Operation and Maintenance

After the transition to CAAP, its financial statements are to be released but they have not been publicized as of April 2012 and the status of account settlement is not clear. At the time of ATO, ATO budgeted recurrent cost and DOTC bore investment cost. After the establishment of CAAP, CAAP is supposed to prepare investment and recurrent budget. These two factors do not change from the ATO age and financial reform by ATO to CAAP transition has been incomplete.

Currently, CAAP prepares Annual Procurement Plan (APP), budgets it and receives approval by DOTC. Among APP (2011), budget for Air Navigation Facilities (ANF) was given as 109.07 million Pesos by accumulation of each item.

Implementation process of the budget for operation and maintenance has the following concerns. For instance, as an issue with the entire procurement process of CAAP, ANS cannot procure parts in a timely manner and as necessary. The reason is that CAAP adopts government procurement rules for its procurement of parts and equipment. Parts producers are restricted and CAAP cannot conclude a discretionary contract, but must adopt competitive bidding through its procurement committee. This does not fit to the necessity and reality of the situation.

3.3.4 Current Status of Operation and Maintenance

As of April 2012, all equipment is working properly, but the following points are concerns.

3.3.4.1 Repair and Replacement Situation

(1) Generic Parts

Sufficient original spare parts were stocked for a 2-5 year supply, and all of the consumable parts (generic parts such as bulbs and fuses) have been utilized. These generic parts are locally available and replaced or repaired.

(2) Important Substrates

Since 2010, main circuit boards, such as substrates of frequency modulator of the equipment can cause breakdowns and MMC can sometimes repair them and sometimes cannot.

Photo 3 Manila Maintenance Center

Photo 4 Repairing Transceivers

In some cases, equipment, which is supposed to have main and standby system, is running only

on one system because the other system is defective. Furthermore, in case a main system breaks down, a parts from other airport equipment with two systems is to be brought in. MMC can repair the defective substrates but not in all cases. Thus, CAAP tries to procure some substrates and circuits from original manufacturer such as those in Japan, but this has some problems as well. For instance, the original VOR manufacturer is no longer producing VORs, but can supply necessary substrates as required under the fifteen-year warranty for supply of spare parts. The project contractor, Toyota Tsusho Corporation[6] is working as a conduit for the procurement. Since March 2011, CAAP and Toyota Tsusho have negotiated and Toyota Tsusho issued a quotation. However, CAAP has not officially ordered the parts by discretionary contract base up to April 2012. Thus, CAAP cannot procure the necessary parts.

(3) Breakdown of Equipment

As Voice Logging Machines breakdown, some airports are operating only on one main machine and some are operating without any machines. ICAO requires voice recording machines. In addition, the original manufacturer of Voice Logging Machines no longer exists and it is difficult to repair or replace the machines. Uninterrupted Power Supply (UPS) often breaks down and some equipment is operated without UPS. Without UPS, some equipment cannot transmit signals due to power interruption or failure and this causes heavy load on equipment.

3.3.4.2 Removal of Facilities and Change of Facility Usage

Due to expiration of land lease contract, the landowner, Tagaytay City, requested CAAP to return the land used for extended range facilities of receivers and transmitters. Tagaytay City is a tourism spot facing Taal Lake and hotels and resort condominiums have been developed recently. Tagaytay City considered the site suitable for tourism development rather than leasing to CAAP and did not extend the land lease contract and requested the land be returned. CAAP negotiated to continue to use the land but was forced to return it. As the next best choice, CAAP is making efforts to operate the equipment. Then, CAAP moved all equipment to another location to prepare for re-installation, and demolished the buildings, but some fittings were reused. CAAP is taking care to minimize the impact on the existing facility's functions (by CAAP). Since 2010, some rooms of MMC have been used as offices of ANS and there has been no problem with the function of MMC.

3.3.4.3 Management and Repair of Facilities

Facility management of airport control towers had some problems such as an out-of-service

[6] TOMEN Corporation, original contractor of this project, was merged with Toyota Tsusho Corporation.

elevator (Kalibo Airport, budget allocated) and roof leakage (Laoag Airport). If ANS staff reports such problems to headquarters, ANS will take appropriate actions. There seems to be some problems with miscommunication and insufficient budget processing.

Therefore, ANS of CAAP basically secures the operation and maintenance and it is not in a situation to jeopardize the operation of aircraft. CAAP purchases sufficient generic parts and MMC performs necessary repair work. However, the larger procurable equipment such as UPS and non-generic parts (such as parts and substrates which can be provided only by the original maker) are not procured properly, and the recommendations for provision of spare parts supply and enhancement of equipment repair systems by the ex-post evaluation has not been sufficiently implemented.

4. Conclusion, Recommendation and Lessons Learned

4.1 Conclusion

Effectiveness to air safety and positive impact on air transport sector by this project has been continuously sustained. However, deviation from ICAO standards and international air transportation market trend, the Philippine air sector is lagging behind the international level.

Even after the introduction of a new air traffic control system such as New CNS/ATM, the air traffic control system by this project will be required for an additional ten years or longer. If spare parts are not procured properly, it is a concern that the equipment will not be able to maintain its current functionality.

4.2 Recommendation

DOTC: The reform by the transition from ATO to CAAP has been incomplete and DOTC is expected to authorize broader discretion of CAAP for budgeting and implementation in order to clarify the financial responsibility of CAAP for operation.

CAAP: This Project procured a wide variety of equipment and appropriate maintenance and necessary parts supply are essential. First, CAAP should secure the budgeting and its implementation for generic parts (mostly consumables). Second, if non-consumable parts are not generic and unable to be repaired, it is difficult to procure them by the general competitive bidding defined by the national government. Therefore, it is necessary to facilitate the procurement of these parts by discretionary contract base or long-term maintenance contract with each original contractor and maker.

4.3 Lessons Learned

A yen loan project featuring a variety of equipment often requires involvement of original equipment makers at the stage of operation and maintenance. Although the borrower country bears the recurrent cost, it is desirable to agree with the executing agency how to supply spare

parts properly at the stage of implementation.

Comparison of Planned and Actual Scope

Item	Planned	Actual
1.Output	(29 airports/facilities)	(25 airports /facilities)
(1) En-Route Air Traffic Control Facilities	・Improvement of air traffic control facilities (expansion of VHF wave coverage on the west side and on the south side, improvement of Remote Center Air Ground Communication [RCAG] at 2 sites) ・Improvement of terminal control facilities (8 airports)	As planned Nearly as planned
(2) Aerodrome/ Approach Air Traffic Control Facilities	・Development of FSS facilities: Cauayan, Puerto Princesa	Nearly as planned
(3)Air Navigation Communication Facilities	・Development of an Automatic Telex Message Switching System for securing point-to-point aerial communication network: 14 airports ・Renovation and installation of air navigation radio facilities for use on air routes and at airports (VOR/DME)	Not implemented Nearly as planned
(4) Terrestrial Communication Facilities	・Expansion of terrestrial based communication facilities (between Davao Airport and Tagaytay-Manila Center)	Nearly as planned
(5) Satellite Based Communication Facilities	・Improvement of satellite communication facilities (14 airports, Mt. Majic transmitting/ receiving station, Manila AFC)	Not implemented
(6) Maintenance Center	・Development of a maintenance center inside Manila Airport, placement in the center of spare equipment parts of all airports, and provision of a supply system	As planned
Consulting services	International: 184M/M Local: 182M/M	As planned
2. Project Period	August 1995-August 1999 (4 years, 1 month)	August 1995- June 2004 (8 years, 11 months) Completion of construction work: March 2004
3. Project Cost Foreign Currency Local Currency Total ODA Loan Portion Exchange Rate	 6,386 million yen 738 million yen (179 million pesos) 7,124 million yen 6,386 million yen 1 peso = 4.13 yen (January 1995)	 6,203 million yen 1,419 million yen (354 million pesos) 7,622 million yen 6,203 million yen 1 peso = 4.01yen (Average rate 1995 - 2004)

【Ex-Post Monitoring of Completed ODA Loan Project】

Sri Lanka

"Samanalawewa Hydroelectric Power Plant (I) (II) (III) and
Samanalawewa Hydroelectric Project (Reservoir Remedial Works)"

External Evaluator: Jun Kuwabara,
(International Development Center of Japan Incorporated)

1. Project Description

Project Location

Samanalawewa Dam

1.1 Project Objectives

The objective of this project was to address the shortage of electricity supply in Sri Lanka by constructing a reservoir-type hydroelectric power plant with a maximum output of 120 MW in the upstream of Walawe River, approximately 160 km southeast of Colombo, thereby contributing to the economic development and improvement of the welfare of the country.

1.2 Outline of the Loan Agreement

Loan Approved Amount/ Disbursed Amount	1st Phase: 14,500 million yen/14,500million yen 2nd phase: 13,920 million yen/13,920 million yen 3rd phase: 3,264 million yen/3,264 million yen (Remedial works): 5,282 million yen/3,134 million yen
Loan Agreement Signing Date/ Final Disbursement Date	1st Phase: July 1986/September 1992 2nd phase: July 1987/April 1994 3rd phase: January 1991/March 1995 (Remedial works) : July 1995/March 2005

Ex-post Evaluation	2006
Executing Agency	Ceylon Electricity Board (CEB)
Main Contractor (Over 1 billion yen)	Joint venture of Kumagai Corporation (Japan), Hazama Corporation (Japan), and Kajima Corporation (Japan)
Main Consultant (Over 100 million yen)	Nippon Koei Co., Ltd. (Japan)

1.3 Background of Ex-post Monitoring

Along with the steady economic growth of the country, the electricity sales in Sri Lanka grew rapidly by 8.2% per year on average from 1980 to 1985, and the demand for electricity was predicted to further increase. As a measure to cope with such increase in demand, the Government of Sri Lanka (GOSL) planned to operate large-scale coal-fired power plants, which estimated a huge delay in actual construction. The gap between electricity demand and supply was then anticipated to become severe in the first half of the 1990s. This project was planned with the aim of alleviating the disproportionate supply-demand situation for electricity.

This project was co-financed by Japanese ODA loan and loans provided by the U.K. The Japanese ODA loan was extended to the construction of diversion tunnels, dam, hydraulic turbine and penstock, and construction management cost, while U.K Portion was extended to the construction of intake and waterway, power generating mechanical plant and design cost. During the construction of the dam in 1988, a highly permeable section was found in the ground of the right bank, and CEB modified the project plan to add cut-off work (curtain grouting), etc., to which the remaining amount of the third phase of the Japanese ODA loan was disbursed. After the completion of the construction, when the water-filling test was conducted in the reservoir in 1992, a large amount of water leakage occurred from the right bank into downstream areas. The GOSL set up an “International Panel” to examine potential countermeasures to address this problem. As a result, it was decided to implement the wet blanketing method2 (remedial work) as a countermeasure. For the remedial work, Japanese ODA loan was disbursed starting from 1995.

The overall rating in the ex-post evaluation conducted in 2006 for this project was “D” (dissatisfactory) mainly for the following reasons:

- The actual project period exceeded the plan due to the additional work against water leakage, which resulted in the rating “B” for the project efficiency.
- The actual annual power generation was lower than planned, mainly due to the decrease of water discharge for electricity generation that mainly comes from the decrease in rainfall and the increase in discharge of irrigation water, which resulted in the rating “B” for the project effectiveness.
- Water leakage from the right bank into downstream areas rapidly increased although the main cause was not detected when the field survey for the ex-post evaluation was conducted. Challenges were admitted for securing safety on a long-term basis, and the project sustainability was rated as “C”.

Observing that the water leakage decreased as the reservoir water level lowered, the ex-post evaluator concluded to draw a recommendation to CEB. That is "*Continue observing the amount of leakage, water quality, reservoir water level and the groundwater level at the right bank while maintaining the low water level and at the same time consider taking measures as necessary based on the study undertaken by experts and the results of additional surveys, measurements and analyses to be conducted when necessary*."

Therefore, this project was selected for ex-post monitoring and reviewed under each criterion, particularly to assess the project sustainability, and to reconfirm the project effectiveness and impact, with the findings from the field survey and other research activities with a final conclusion being drawn.

2. Outline of the Monitoring Study

2.1 Duration of Monitoring Study

Duration of the Study: January-September 2012

Duration of the Field Study: July 4-16, 2012

2.2 Constraints during the Monitoring Study

Not applicable.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

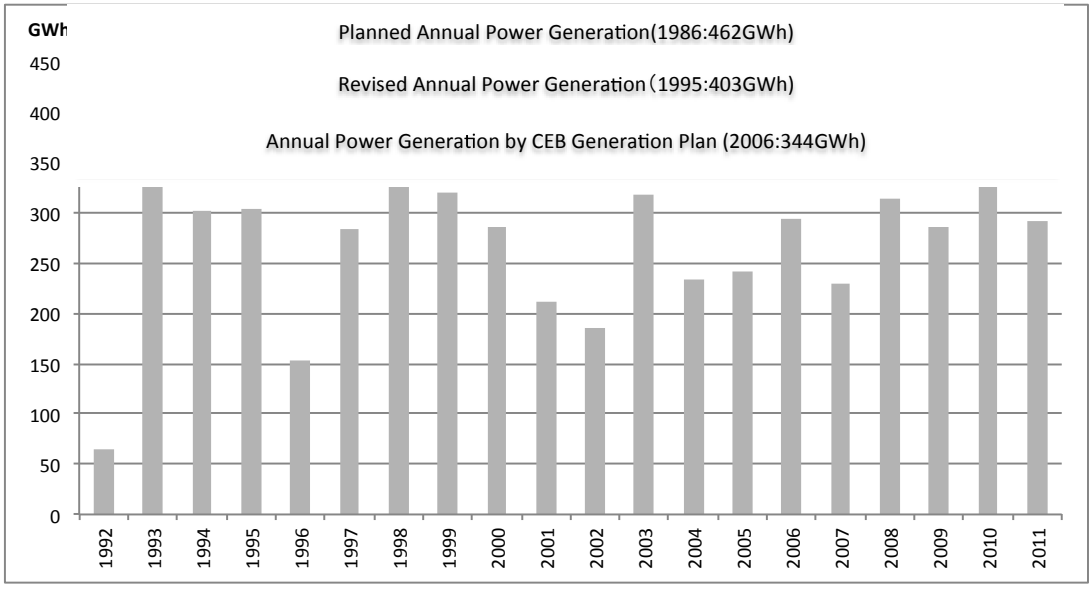
3.1.1.1 Results from Operation and Effect Indicators

(1) Net Electricity Energy Production

Table 1 shows the operation and effect indicators of the project: net electricity energy production and maximum output from 2006 to 2011. The average of annual electricity energy production through to 2011 reached 298 GWh, which is higher than the average at the time of ex-post evaluation in 2006 (271 GWh). It was however lower than the design energy of 462 GWh, revised energy of 403 GWh, and mid-term annual generation forecast by CEB of 344 GWh.

Table 1: Net Electricity Energy Production and Maximum Output of Samanalawewa Dam (2006-2011)

	2006	2007	2008	2009	2010	2011	1996-2011 Average
Net Electricity energy production (GWh)	294.5	229.3	312.8	285.4	375.4	292.2	298
Maximum Output (MW)	Over 120	Over 120	128	128	130	128	Over 120



Source: Developed from CEB data.

Figure 1: Comparison of Designed Energy and Actual Power Generation at Samanalawewa Hydroelectric Power Plant

The ex-post evaluation made analyses on the major reasons that caused the power generation to be lower than planned. Those were annual rainfall into the catchment area and water inflow into the dam reservoir decreased and the discharge volume of irrigation water increased.

In this ex-post monitoring, the data of monthly water inflow and rainfall from 2006 to 2011 were newly collected and added to the ones obtained at the ex-post evaluation, which are shown as Figure 2 and Figure 3.

The planned average inflow volume to the reservoir was estimated at 17.9 m3/s per year, based on the actual volume of 18.5 m3/s measured from 1959 to 1979[1]. Average volume of water inflow from 1996 to 2011 is lower every month than that from 1959 to 1979 as shown in Figure 2, and the annual average from 1996 to 2011 remained at 14.2 m3/s, which is 79 percent of the designed figure. It was estimated that the smaller volume of water inflow into the reservoir has reduced 90 GWh annually from the total power generation.

The lower water inflow was caused by the decrease in rainfall as shown in Figure 3. Annual rainfall from 1996 to 2011 is 1,940 mm on average, which is approximately 83 percent of that of 1959 to 1979:

[1] For both average volume of water inflow and annual rainfall, the measured amount from 1959 to 1979 and planned amount at the time of project planning were referred in the Ex-Post Evaluation.

2,320 mm.

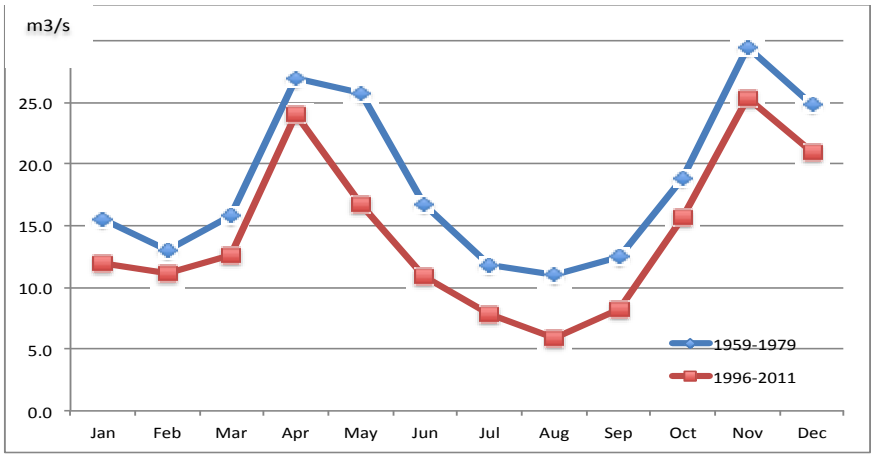


Figure 2 Comparison of Water Inflow before and after the Project (Monthly Average)

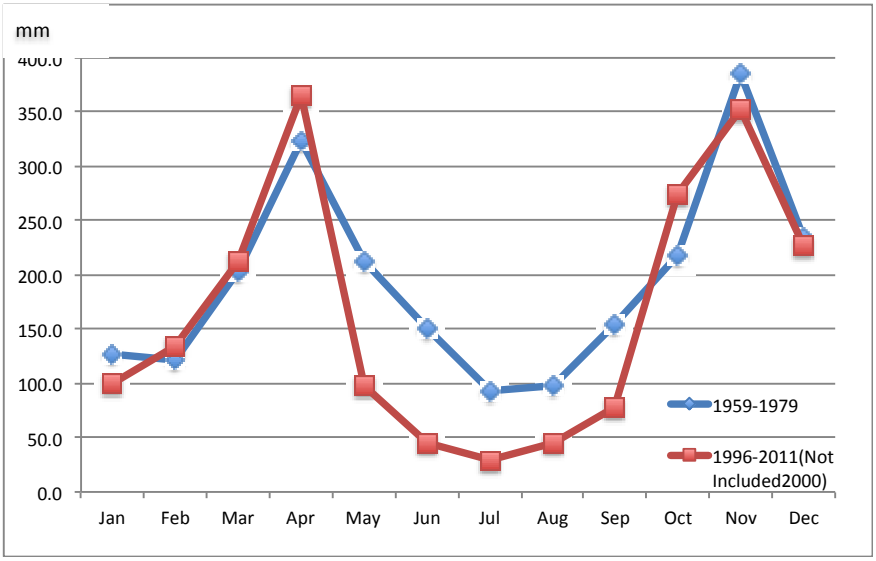


Figure 3 Comparison of Rainfall before and after the Project[2] (Monthly Average)

From the Samanalawewa Dam, irrigation water is discharged to the Kaltota Agricultural District downstream without going through the power station. The water leakage from the right bank and water discharge through the dam are spent for irrigation, and the actual average volume of discharged water from 1996 to 2011 is 92 million m^3 annually (2.9 m^3/s), which far exceeds the original plan: 50 million m^3. It was roughly estimated that this difference has caused a reduction in power generation by 40 GWh per year.

(2) Maximum Output

Maximum output had been recorded around 120 MW since 2006 to 2011 (see Table 1), although their duration of peak generation was short. And it can be said that the output was utilized to cope with the peak electricity demand.

[2] Rainfall data of February 2000 was missing and it was not taken into account in the Figure.

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

The data from 1992 to 2004 obtained at the ex-post evaluation were found to be unreliable[3], and collecting the necessary information and data during the said period was not possible in this study although data from 2005 to 2011 was available. Due to incomplete collection of such data, the ex-post monitoring did not undertake a recalculation of FIRR and EIRR.

The EIRR calculations up to the ex-post evaluation were based upon the cost required for a thermal power plant at same scale which drew superiority in cost for hydroelectric power station.

Operation cost per electricity generation unit by hydroelectric power generation facilities stays lower than that of diesel thermal power generation facilities in Sri Lanka, and it is inferred that hydropower generation still has advantages in prices against thermal power generation.

3.1.2 Qualitative Effects

Not applicable.

Although the electricity energy production has not reached the planned target due to a decrease is waterfall and other factors, the average power generation from 2006 to 2011 exceeded the average up to the ex-post evaluation (2006). In terms of enhanced electricity energy production and moderate operation cost, the project is still found effective at the time of ex-post monitoring.

3.2 Impact

3.2.1 Intended Impact

3.2.1.1 Stable Electricity Supply

Table 2 shows major electrical indicators of Sri Lanka from 1986 to 2011. Increase in demand for electricity in the country during the said period was prominent, and the annual electricity energy production and peak demand of 2011 rose to approximately 4.3 times and 4 times greater than that of 1986 respectively. The annual average electricity energy production of Samanalawewa was 298 GWh up to 2011, which shared 2.8 percent of total energy production of the country (10,714 GWh). Peak electricity capacity of Samanalawewa is 120 MW, which had a share of 5.5 percent of the peak demand nationwide in 2011. Although the share of the Samanalawewa Power Station was on decrease as the total annual electricity production and peak demand in Sri Lanka keeps increasing, it is confirmed that the Samanalawewa Power Plant has contributed to stable electricity supply of the country.

Table 2 Electrical Indicators Nationwide

	1986 (Project commencement)	2004	2011 (Ex-Post Monitoring)

[3] In this study actual data of O&M cost from 2005 up to present were collected, which are 10 times more than that up to 2004. The ex-post monitoring team revealed that the operation cost in 1992 was not taken into account, for instance. O&M cost was found to be an estimate, not actual data, with parameters such as electricity production.

Installed Capacity (MW)	1,065	2,280 (2.1 times)	3,141 (2.9 times)
Annual Electricity Energy Production (GWh)	2,652	8,159 (3.1 times)	10,741 (4.3 times)
Peak Electricity Demand (MW)	540	1,563 (2.9 times)	2,163 (4.0 times)
Household Electrification Rate (%)	17	71 (4.2 times)	91 (5.4 times)

Source: CEB Statistics

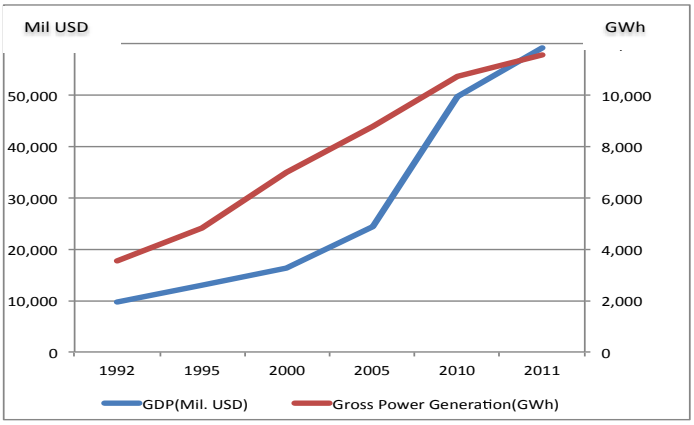
Note: Figures in parentheses are comparison with those of 1986.

3.2.1.2 Increase in Electricity Energy Consumption and Contribution to Economic Growth

GDP at constant prices, real economic growth rate, GDP per capita at constant prices, and per capita growth are shown in Table 3. Since the Samanalawewa Power Station started operation in 1992, GDP has shown steady growth although it dropped when a severe recession occurred in 2001 caused by complexity of long-time civil war, terrorism, poor crops due to severe drought and power failures and by global financial crisis in 2008 that was caused by economic downturn precipitated by the Lehman Brothers bankruptcy. GDP per capita also increased greatly from 557 USD in 1992 to 2,835 USD reflecting the same tendency as GDP. Figure 4 gives an implication that the electricity energy production increased steadily, as the country's economy grew, to which the Project made a contribution.

Table 3 GDP and Real Economic Growth Rate

	1992	1995	2000	2005	2010	2011
GDP (Mil. USD)	9,703	13,030	16,331	24,406	49,568	59,172
GDP Growth Rate (%)	-	5.6	5.0	4.0	6.4	8.3
GDP Per Capita (USD)	556.8	718.4	854.9	1242.4	2,400.0	2,835.4
Average Growth Rate (%)	-	4.3	4.0	3.4	5.3	7.1



Source: World Bank, World Indicators, 2012, and CEB data.

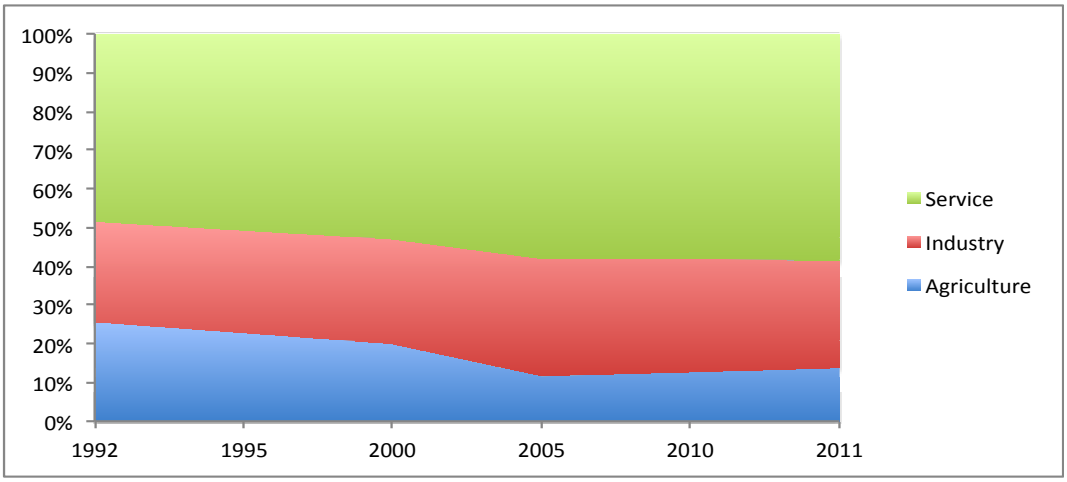
Figure 4 GDP Growth and Gross Power Generation

Table 4 shows the industrial sector and service sector grew rapidly compared to the agricultural sector up to 2005. Although the share of industrial sector has been at a standstill since 2005, outputs

from these two sectors keeps growing. Further development of the two sectors requires stable electricity supply, and the Project meets such immediate needs for the country's economic growth and thus has had a positive impact on the country's economic development.

Table 4 Structure of GDP (Unit: %)

Sector	1992	1995	2000	2005	2010	2011
Agriculture	23.5	20.6	17.8	11.8	12.8	13.7
Industry	23.3	23.8	24.4	30.2	29.4	27.8
Manufacturing	(14.0)	(14.1)	(15.1)	(19.5)	(18.0)	(17.2)
Service	44.1	45.2	47.3	58.0	57.8	58.5



Source: World Bank, World Indicators, 2012.

Figure 5 Structure of GDP

Therefore, it was confirmed in this ex-post monitoring that the Project still plays a crucial role in contributing to stable electricity supply in Sri Lanka, enhancement of economic growth and improvement of social welfare.

3.2.1.3 Impact on the Natural Environment

No serious impact on the flora around the dam reservoir was reported from the interview with CEB staff and local residents as of the ex-post evaluation in 2006.

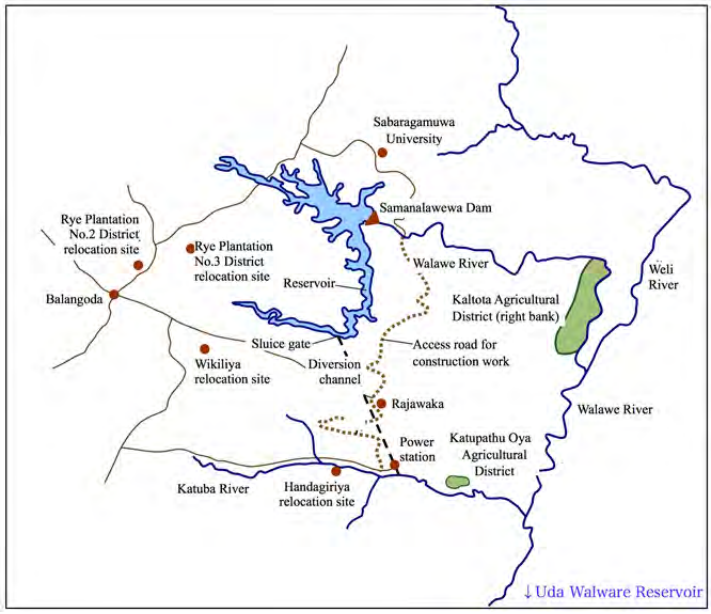
CEB obtained ISO14001 in December 2006, and the Samanalawewa Power Station has listed 672 items that might affect natural environment which accordingly are checked every two months. CEB selected and carefully monitored 102 out of 672 that were identified as the most critical items having impact on natural environment. CEB conducted monitoring on water quality at dam reservoir (one site), upstream (four sites), and downstream (two sites). Monitoring results up to 2011 indicated that all figures have stayed within the national environmental standards. CEB continues monitoring the flora every month as of December 2006 when CEB obtained ISO 14001, which has had no problems up to now.

3.2.1.4 Land Acquisition and Resettlement

It was Rathnapura District and the relevant Divisional Secretariat (DS) under the District that took initiatives in land acquisition and resettlement of the local residents, through which CEB made payment for compensation. Three DSs were involved as the project area was across three administrative boundaries. CEB has received periodic reporting from them about the progress of resettlement.

At least two households have not received relocation and compensation payment in the project area. Relocation and compensation payment was on progress for 49 households at Handagiriya site when the ex-post evaluation was conducted. As of July 2012, it was found 48 households already completed the process. In Imbulpe district, one household did not agree to resettle and will take further time for reconciliation although the objection was unknown. The remaining households are located beyond the maximum water level of the reservoir (Mean Sea Level: MSL 460m) and there was no impact on project continuation. The number of local residents who used boats to cross the reservoir decreased as they relocated to other places, and CEB implemented a boat service.

Brief interviews were conducted with resettled peoples in this ex-post monitoring. Many of them reported dissatisfaction for not being given the certificates of their land tenures. The details of the incidents were kept unknown as it had been nearly two decades since the resettlement started in the latter half of 1980s, and the DSs were not reached in this study. It was confirmed in this study that the resettlement procedure has not been completed yet.



Source: Ex-Post Evaluation Report.

Figure 6 Samanalawewa Dam Reservoir and Surrounding Area

3.2.1.5 Other Impacts

(1) Impact on Irrigation Works

CEB provides water from the Samanalawewa Dam downstream to the Kaltota Agricultural Area for irrigation works based on the request from the Department of Irrigation and in agreement with the Water

Management Board. The water coming from the leakage on the right bank of the Dam is regarded as part of the water outflow from the Dam. Some interviewees replied that their paddy yields have increased since the Samanalawewa Dam Reservoir started operation, along with the innovation of agricultural technology.

Picture 1 Kaltota Agricultural Area (overview, close-up view and canal)

The water outflow from the power station which bypasses the dam is used as irrigation water downstream in the Katupath Oya Agricultural Area. The ex-post evaluation mentioned that the increase in the water flow downstream contributed to the irrigation works in the basin of Walawe River, which is further downstream from the said agricultural areas. However, the Uda Walawe Power Station (Reservoir) is located 2 km downstream of the Katupath Oya Agricultural Area, where no irrigated area is identified in the satellite image. Therefore the contribution to the irrigation in other places than the said two agricultural areas was found to be limited.

(2) Impact on Regional Development

According to the ex-post evaluation, a 23 km road was constructed as an access road for construction work and the road was used as a general road by the local residents in their daily lives. The road was operated and maintained by the Samanalawewa Power Station, and handed over to the Road Development Authority (RDA) in 2006. The chief engineer of the power station was of the opinion that the road condition had been improved and better managed since then. The traffic volume in 2012 was 50 vehicles per day on average.

Using the land where the temporary work station of the Project was located, a new university (Sabaragamuwa University) was established. The university increased the number of faculty and enrollment of students, and there are 170 staff members and 2,900 students enrolled as of the end of 2010. A youth training center which was built near the sluice gate of the headrace tunnel was also part of the work station. There are training programs implemented at the center that are still up and running. One temporary building for the construction period near by the access road to surge chamber was handed over to Department of Agriculture. This building was also used for training and research activities for them.



Picture 2 Access Road　　Sabaragamuwa University Youth Training Center

Therefore, it is confirmed that the Project has brought certain positive results to the stable power supply, social welfare, economic growth and regional development. There was significant progress made in paying compensation to the resettled local residents, however this has yet to be completed.

3.3 Sustainability

3.3.1 Structural Aspects of Operation and Maintenance

CEB is a fully government-owned public corporation under the supervision of the Ministry of Power and Energy and has 16,192 employees as of the end of 2011. Independent power producers (IPPs) have been established in some areas recently as power generation is no more a government monopoly as a result of the energy sector reform. The details and schedule of further implementation of sector reform have not been decided yet, and CEB will continue being engaged in power generation, transmission, and distribution.

The Samanalawewa Power Station belongs to the Generation Headquarters of CEB. There were 106 staff members working at the Power Station at the time of ex-post evaluation, and this increased to 122 as of July 2012. There has been however no change in the organizational structure, and the additional 16 members were allocated to vacant positions.

3.3.2 Technical Aspects of Operation and Maintenance

Technical staff members at the Samanalawewa Power Station have adequate educational background and years of experience. Training opportunities are provided to CEB staff annually in a systematic manner by CEB and the power station. External and internal training courses conducted at CEB are varied and offer over 20 programs, and internal program in particular, are well planned based on ISO9001 and CEB's mid-term vision. A wide range of the contents of the training includes emergency operations, public health and daily vehicle maintenance, etc.

3.3.3 Financial Aspects of Operation and Maintenance

According to the Financial Annual Report 2011, CEB had deficits in its current account of as much as 18 billion rupees in 2011. Overall, the financial structure of CEB is not in good shape. CEB's financial deterioration has not been resolved yet mainly because share of low-cost hydroelectric power generation is on a decrease, oil price hikes and the increase in payment to IPPs. The Public Utilities Commission of Sri Lanka (PUCSL) is now mandated to regulate the electricity sales price in Sri Lanka, and it was

expected that CEB's financial structure should improve accordingly. However CEB falls into deficit whenever electricity energy production by hydroelectric power generation facilities is reduced due to droughts.

Although CEB often suffers from financial deficits, CEB makes a decision to allocate sufficient budget for the operation and maintenance of the power stations with a high level of priority because it immediately affects the electricity sales. Therefore, no problems have occurred so far in the operation and maintenance of the Samanalawewa Power Station due to shortages of finances.

3.3.4 Current Status of Operation and Maintenance

3.3.4.1 Region-wide Integral Operation

The Samanalawewa Power Station adjusts its power production according to the maintenance status of other major hydroelectric power generation facilities and water levels of their dams located in the Mahaweli system and Laxapana system, by the orders of the National System Control Center located in Colombo. However, no indicators were confirmed in this study that reflects such regional operation's influence. The natural environmental condition and operational status differs in each power station. For example, they allocate more water for irrigation works in the Mahaweli system, which limits the amount of water discharged for power generation. The volume of water stored differs by dams. With these variations taken into consideration, electricity energy production which can be better managed by water system and further contribute to the effective usage of water resources for the entire nation

3.3.4.2 Organizational Management

Following ISO9001, Samanalawewa Power Station was awarded with ISO14001 in December 2006, and has updated certifications periodically. It has enabled Samanalawewa Power Station to make prompt decisions by managing all the documents, sharing all information among staff and coping with critical issues by core members.

3.3.4.3 Procurement of Spare Parts

It was mentioned in the ex-post evaluation that it took longer time for CEB to procure spare parts for the equipment and facilities of the Samanalawewa Power Station. A spare parts manufacturer recently opened its office in India, which helped CEB procure needed parts quicker and problems were mitigated.

3.3.4.4 Deterioration of Equipment

It has been approximately 20 years since the Samanalawewa Power Plant commenced operations in 1992. Equipment and facilities at the power station have deteriorated due to usage over time, out of which the following four are in critical condition:

(1) Breakdown of monitoring control systems of generators

Three out of four monitoring control systems of power generators have broken down, so power plant staff monitor and control the generators using the sole remaining one. If the remaining one should also break down, the generators could be operated manually without taking into account various indicators

such as water temperature. The spare parts of the broken down equipment are no longer available, and repair work is not possible. It has turned out that it would cost 500 million rupees to replace all the relevant equipment of the monitoring control system. As of July 2012, they were examining alternatives with lower cost in the formed technical committee.

(2) Deterioration of Quality of Rock Material

The rock material of the dam, to a wider range, has oxidized and deteriorated as it experienced expansion and contraction due to exposure to sunlight, heat and cold. Most deteriorated rock became sandy, and it could not bear strength to sustain the structure. It is time to replace this, and selection of new rock material will require judicious technical examination, such as rock composition, in order not to repeat similar problems in the near future. As of July 2012, CEB was examining countermeasures with the University of Peradeniya.

(3) Breakdown of Programmable Logic Controller

The programmable logic controller, PLC, had been out of order for the gate system of the spillway. Taking into account the precipitation probability in Samanalawewa, only once in four to five years does CEB operate the gate system. They currently operate the dam at 5 m lower than the maximum level of the reservoir, which requires less need for operating the gate system. It was estimated to cost 20 to 30 million rupees to replace the PLC, which is affordable for CEB.

Picture 3 Monitoring Control System

Deteriorated bedrock

PLC

(4) Breakdown of Guard Valve

The guard valve is connected to the one which allows water discharge for irrigation. The power station keeps discharging water for irrigation throughout the year. They open and close the valve when they conduct periodic maintenance once or twice a year. As the valve is broken, CEB staff opens and closes it manually. As of July 2012, CEB was negotiating with the equipment suppliers on the replacement of equipment and prices.

Picture 4 Guard Valve

3.3.4.5 Water Leakage

(1) Background

Picture 5 Water Leakage Point

CEB conducted an initial survey in December 2006 with in which they tried to detect the cause of the sudden increase of water leakage. CEB agreed to take an immediate action in October 2007 in response to the recommendations drawn in the ex-post evaluation, with economic viability of the dam operation secured.

The amount of water leakage surged to 4.6m3/s in December 2006, which marked the high point. The amount of water leakage lowered in June 2007, and it was around 2.5 m3/s after 2008, although it is slightly above the average of 1.8m3/s for the ten years from 1996 to 2006.

(2) Safety Measures

CEB reconfirmed that the long-term structural safety of the dam would not be secured while it had water leakage. In order to lower the water pressure at the leakage point, they decided to lower the maximum level of water by 5m up to 455m. They revised the operation manual to cope with the water leakage, and built an early warning system for the downstream areas. CEB also supported the local administrative bodies to develop and implement a disaster drill in order to enhance their preparedness against disasters.

(3) Surveys to identify the cause of water leakage

There were two surveys in which countermeasures were examined and recommended to deal with the water leakage at the dam reservoir. Those were a doctoral dissertation by Dr. L.B.Kamal Laksiri (Project Director Bloadlands Hydropower project of CEB) and its follow-up survey, and another survey done by W.B. Atkins Co., Ltd. Table 5 shows the outlines of two surveys.

Table 5: Outlines of Surveys

	Dissertation of Dr. L.B. Kamal Laksiri	Survey of W.B. Atkins Co., Ltd
Period	2007 and follow-up survey (in progress)	2008-2009
Method	Comparison of water level between wells and reservoir	Analysis of water flow by using magnetism and electricity
Scope	All the monitoring wells on the right bank	Places without grout curtains and dislocation areas on the right bank
Identification of water leakage point	415 m MSL on the right bank	439m MSL on the right bank (places without grout curtains)
Further study	Location finding by Isotope	Large-scale survey
Recommended countermeasures	Extension of dry or wet blanket	Extension of grout curtains (project cost: high)

(4) Future Direction

CEB has not made any decision yet if it will conduct further surveys, develop and implement countermeasures. The Generating Department of CEB is torn into several ideas since water leakage is a complex mechanism and countermeasures are not yet proven. Some said that those countermeasures with lower cost should be tried first.

The Ministry of Power and Energy had paid keen attention to this issue, and the Minister ordered CEB to conduct a follow-up study in 2011 to detect the leakage point by using isotope based on the

recommendations of Dr. Laksiri. A water ingress zone in the right bank was estimated to be located at about 415m MSL within about 100m distances along the right bank from the dam body. Furthermore, water ingresses into the right bank in above location, moved in different paths with different distance become coming to the outlet. They scheduled to conduct another survey to further identify the location.

At the time of ex-post evaluation, no problem was found for technical, organizational and financial sustainability of CEB. It was confirmed in this ex-post monitoring that they have continued and enhanced such sustainability to some extent: they have provided technical training opportunities systematically, and enhanced management by allocating required personnel and acquiring ISO9001 and ISO14001. Recurrent budget for the operation of the power station has been allocated with high priority. It was confirmed that sustainability was maintained or enhanced in terms of these three aspects.

Equipment and facilities have deteriorated as it has been 20 years since they started to operate the power station. CEB had detected which equipment and facilities were broken down and examined countermeasures to implement. Although they confront challenges in budget, they should take appropriate actions in a timely manner.

The water leakage that has existed since the initial operation of the power plant station and saw a temporary increase in 2006 has continued up to present. It was confirmed in this ex-post monitoring that CEB has been making efforts to operate the power station with safety measures well taken, and to continue conducting studies to reach further solutions.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Samanalawewa Hydroelectric Power Plant presently supplies electricity in a stable manner, more than the average amount from 1992 to 2005 although it has not reached the planned level yet, and operates to cope with peak demand. Water inflow to the dam reservoir has increased comparing with pre ex-post evaluation times, and it provides water continuously to the irrigation system downstream. Facilities associated with the power plant that were constructed during the construction period have taken part in the area development. There was no new adverse impact on natural environment and social environment, with CEB's monitoring efforts. Disputes over resettlement have not yet been resolved, although the land acquisition and resettlement saw a great progress and CEB was expected to continuously work on this.

The Samanalawewa Hydroelectric Power Plant had enhanced its management by obtaining ISO9001 and ISO 14001, allocation of technical personnel, and implementation of training programs. Although CEB was not in a favorable financial condition, the Power Station is allocated with sufficient budget for operation and maintenance. However, there were equipment and facilities that have deteriorated over 20 years of operation.

CEB saw an abrupt increase of water leakage that occurred in 2006, but had operated the Power Plant with special attention paid to safety. There were two surveys presently being conducted regarding the water leakage, which had not reached final conclusion on the leakage mechanism and

countermeasures. Long-term structural safety should thus be further sought.

4.2 Recommendations

4.2.1 Recommendations to the local administrative bodies and CEB

(1) Rathnapura District and Divisional Secretariat Offices

It was recommended to continue working on the resettlement and CEB was required to monitor the activities and progress.

(2) CEB

It is desirable to examine alternatives that are technically and economically viable and take necessary actions to repair/replace deteriorated equipment and facilities.

With regard to the continuing water leakage on the right bank of the dam, no long-term safe solution is secured yet. It is thus recommended to review the survey outcomes up to present, continue necessary measurements, surveys and analyses, and examine concrete countermeasures.

4.2.2 Recommendations to JICA

It is recommended to correspond with CEB and monitor the progress of the survey and measures for leakage. Once if required, it is also recommended to take necessary action to the concerned organizations and personnel.

4.3 Lessons Learned

Not applicable.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
(1) Outputs		
[Hydroelectric power plant] Diversion tunnels (2) (JP) Dam (JP) Diversion tunnel (UK) Hydroelectric turbines (JP) Power generator (UK) Penstock (JP) Transmission line (other)	[Hydroelectric power plant] Length: 520 m and 545 m Height: 103.5 m, Length: 529 m Effective storage capacity: 254 million m3 Length 5,150 m Turbine discharge: 42.0 m3/s 120MW (60MW X2) Length: 648 m 17 km (power station - Balangoda)	[Hydroelectric power plant] Length: 482 m and 502 m Height: 100 m, Length 530 m Effective storage capacity: 218.2 million m3 Right bank cut-off works Length 5,159 m As planned As planned Length: 670 m 19 km (power station - Balangoda) 39 km (power station - Embilipitiya)
[Remedial Works] Main blanket (JP) Follow-up blanket (JP)	[Remedial Works] Input: 500,000 m3 Input: 500,000 m3	[Remedial Works] Input: 426,030 m3 Cancelled
(2) Project Period	[Hydroelectric power plant]	[Hydroelectric power plant]
[Hydroelectric power plant]	Sep 1986-Jul 1991 (59 months)	Sep 1986- Dec 1992 (76 months)
[Remedial Works]	[Remedial Works] Aug 1995–May 2001 (70 months)	[Remedial Works] Aug 1995–Jun 1999 (47 months)
(3) Project Cost		
[Hydroelectric power plant] Foreign Currency Local Currency Total Japanese ODA loan portion Exchange Rate	[Hydroelectric power plant] 43,139 million yen 17,037 million yen (2,433.8 million Rs) 60,176 million yen 28,420 million yen 1Rs= 7 yen (as of Apr 1986)	[Hydroelectric power plant] 48,112 million yen 22,217 million yen (5,660 million Rs) 70,329 million yen 31,684 million yen 1Rs= 3.93 yen (1986 - 1995)
[Remedial Works] Foreign Currency Local Currency Total Japanese ODA loan portion Exchange Rate	[Remedial Works] 5,061 million yen 1,153 million yen (568 million Rs) 6,214 million yen 5,282 million yen 1Rs= 2.03 yen (as of Feb 1995)	[Remedial Works] 2,359 million yen 905 million yen (453 million Rs) 3,264 million yen 3,134 million yen 1Rs= 2.00 yen (1996-1999)

【Ex-post Monitoring of Completed ODA Loan Project】

Kazakhstan

"Irtysh River Bridge Construction Project"

External Evaluator: Jun Kuwabara
(International Development Center of Japan Incorporated)

1. Project Description

Map of Project Area

Irtysh River Suspension Bridge

1.1 Project Objective

The project objective was to ensure the safe and smooth flow of traffic on a major trunk road by constructing a new bridge across the Irtysh River in Semey city, the country's fourth largest city, thereby contributing to the stimulation of the local economy.

1.2 Outline of the Loan Agreement

Approved Amount/ Disbursed Amount	21,530million yen/21,237 million yen
Loan Agreement/ Final Disbursement	February, 1997/June, 2004
Ex-post Evaluation	2006
Executing Agencies	Akimat of Semipalatinsk Region (Currently Akimat of East Kazakhstan Region Guarantor: Republic of Kazakhstan
Main Contractor	Ishikawajima-Harima Heavy Industries Co., Ltd. (Currently IHI Infrastructure Systems Co., Ltd.)(Japan)
Main Consultant	Katahira & Engineers Inc. (Japan)

1.3 Background of Ex-post Monitoring

This project was implemented in the Semey City (Semey City was renamed from Semipalatinsk City in 2007. Semey City is used in this report.) The city of Semey located in northeastern Kazakhstan, is the country's fourth largest city as well as one of the important industrial cities in Kazakhstan's northeastern area. It was a base for road transport and rail transport that connect Kazakhstan with central Russia. The city of Semey developed along both sides of the Irtysh River, a major river in Kazakhstan. One of Kazakhstan's major trunk roads crosses the Irtysh River in the city of Semey and leads to central Russia, as well as to the Chinese border. However, the only road bridge (hereinafter referred to as the "pre-existing bridge") in the city was the one built for the above-mentioned trunk line. It was a reinforced concrete bridge constructed in the city center in the 1960s; it was severely aged due to the extreme climate and inadequate operation and maintenance and was in danger of collapse. The traffic volume on the pre-existing bridge at the time of the appraisal (1996) was 33,000 vehicles/day, and this figure was expected to increase. Under those circumstances, this project constructed a new suspension bridge (hereinafter referred as the "new bridge") parallel to the pre-existing bridge in the northern part of the city to ensure main trunk route access.

Total project cost was 29 billion 964 million Yen against 28 billion 321 million Yen (amount of Yen Loan is within the planning amount.) Therefore, efficiency was evaluated as moderate, since the total project cost exceeded the planned project budget by 6%. In addition, the sustainability is judged to be low, because handover of the bridge was not implemented, so an operation and maintenance organization still did not exist and no budget allocations and technical handover were being made. To improve this, the following four recommendations were made for the East Kazakhstan Region as listed below in the post project evaluation. i) Handover of the facilities, ii) Establishment of operation and maintenance organization and budgeting, iii) Handover of the operation and maintenance equipment and construction machinery, and iv) Handover of the operation and maintenance manual and its practical use. If these activities would not be conducted in the short term, the Regional government shall take action to provisionally set up of the operation and maintenance structure.

Therefore, this project was selected for ex-post monitoring and reviewed under each criterion, especially focused on sustainability with the findings from the field survey and other research activities with a final conclusion being drawn.

2. Outline of Monitoring Survey

2.1 Schedule of Survey

This monitoring survey was conducted as shown below.

Monitoring Period: January 2012-September 2012

Field Survey Period: April 6, 2012-April 13, 2012

2.2 Constraints of Monitoring

None

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

3.1.1.1 Results from Operation and Effect Indicators

Traffic volume, time required, average speed and safety were studied as indicators for ensuring safe and smooth flow of traffic on the major trunk road.

(1) Traffic Volume

Traffic volume at the ex-post monitoring was increased from the period of ex-post evaluation, as summarized in Table 1. Traffic volume on the new bridge was doubled from 2006, although precise data could not be obtained for pre-existing bridge.

Table 1 Traffic Volume on Irtysh River Bridge

	Ex-post Evaluation (2006)	Ex-post Monitoring (2012)
Traffic volume on new bridge (Both Directions: Vehicles/day)	44,402	88,840
Traffic volume on pre-existing bridge (Both directions: vehicles/day)	34,887	10,000 (Estimation[1])
Total	79,287	88,840 (Excluding pre-existing bridge)
Rate		
Passenger car	83%	74%
Truck and bus	16%	26% (Excluding pre-existing bridge)

Source: Multi purpose utilities enterprise operating Irtysh river suspension bridge and interview for transport department, Semey City

(2) Time Required and Average Speed

Travel time from the beginning point to the end point on the segment including Irtysh river bridge were compared among the appraisal, post project evaluation and ex-post monitoring. The travel time was measured by a driving test run. The comparison was summarized in Table 2. It was indicated that time saving continued in spite of increase in traffic volume. However, it could not be compared simply according to the differences in season, time and method of measurement. Interviews of a few drivers were conducted in order to supplement conditions of peak traffic hour, since this driving test run was conducted at off peak traffic hour. They said that a minor traffic jam was observed in the peak hour of the morning as well as in the evening, but, this was not considered to be so troublesome. Therefore, it was confirmed that time saving effect continued throughout the day.

According to the aforementioned driving test results, average speeds on the new bridge route and the

[1] Source: Interview from Semey City Traffic Dept.

pre-existing bridge route were calculated as 48km/h and 36km/h, respectively. The speeds on the new bridge route were much lower than that of the opening period. However, we could confirm that effectiveness is maintained by the fact that there was significant increase in traffic volume and these speeds were almost equal to that the average of the trial done in the ex-post project evaluation period (2006).

Table 2 Travel Time and Average Speed of the Route

		Planned (Opening)	2006	2012
Travel time				
	New Bridge	8.5 minutes	11 minutes	9.7 minutes
	Pre-existing Bridge	17.1 minutes	21 minutes	15.0 minutes
Average speed				
	New Bridge	60 km/h	47 km/h	48 km/h
	Pre-existing Bridge	32 km/h	26 km/h	36 km/h
Condition				
	Date and Time	-	October 4th, 2012, (weekday) around 9 AM	April 12th, 2012 (weekday) Around 11 AM
	New Bridge Route	8.5 km	7.0 km, results are estimated to from 8.5 km driving trial	Equivalent to the planned route, 7.8 km
	Pre-existing Bridge Route	9.0 km	9.1 km, results are estimated to from 6.0 km driving trial	Equivalent to the planned route, 9.1 km
	Method of trial survey	-	n.a.	Following to speed limit.

Source: Interview for transport department, Semey City.

(3) Safety Improvement

Table 3 summarized the number of accidents occurring on the new bridge from 2008 through 2011. The average number of accidents was 2.5 in the past four years, while it was 3.5 in the 2005 to 2006. It can be said that the number of accidents is low taking into account the increased volume of traffic. According to the questionnaire survey of the ex-post project evaluation, there were many accidents in the winter season. However, the number of the accidents in freezing road conditions was 2 out of 10. So it could not be said risk in the wintertime was high due to this data.

Table 3 Number of Accident on the New Bridge

	2008	2009	2010	2011	Total	Average
Number	2	5	0	3	10	2.5
Injured	2	4	0	4	10	2,5
Death	0	1	0	0	1	0.25

Source: Semey Traffic Police in Semey City

Road safety measures including speed limit had not been taken by the post project evaluation period because the bridge was not handed over to Semey City. After the handover in April 2008, Semey City took safety measures which included snow removal in addition to introduction of speed limits. The speed limit was 60km/h in the summer time (April to October) and 40km/h in the wintertime (November to March). Moreover, drivers' compliance to the speed limit was estimated to have increased because Semey traffic police conduct regular surveillance by patrol cars. This might have contributed to the decrease in the number of accidents including in wintertime even while traffic volume increased.

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

The financial internal rate of return (FIRR) was not calculated at the time of the ex-post evaluation due to the introduction of a toll free system. Therefore, FIRR was not calculated by this ex-post monitoring study either for the same reason. The economical internal rate of return (EIRR) at the same time as ex-post evaluation is as follows.

EIRR: 21.4%

Expense: Project cost (excluding tax), operation and maintenance cost

Benefit: Reduction in travel time (traffic volume, type of vehicles, GDP per capita)

EIRR was not calculated by this ex-post monitoring study due to the reasons listed below.

・All indicators related to benefits drastically increased, so total benefit also increased.

・The operation and maintenance cost for facilities was sufficiently secured. The possible loss in value to the bridge that could occur cannot be assessed by this study’s framework.

As explained above, this project objective has satisfactorily achieved expected results in terms of improvement in traffic volume, reduced travel time, average speed, and traffic safety.

3.2 Impact

3.2.1 Intended Impacts

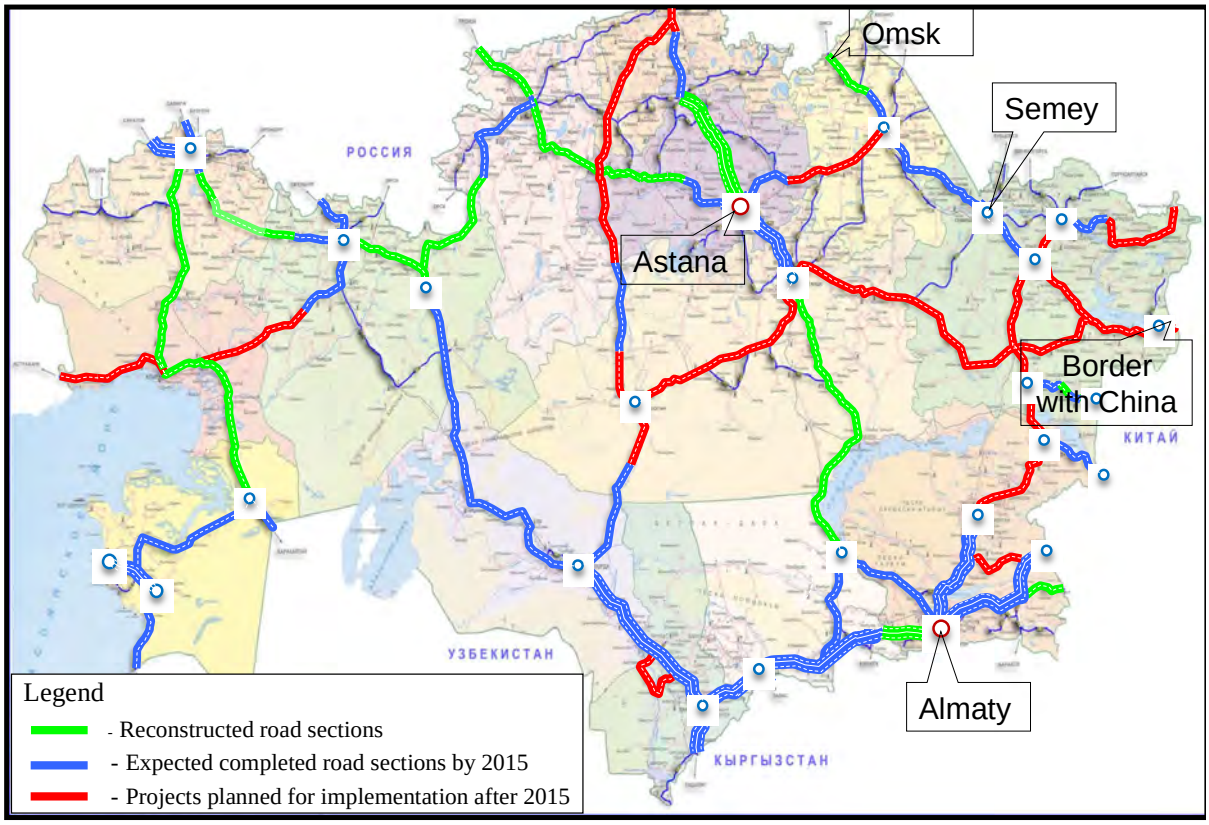
3.2.1.1 Stimulation of local economy

(1) Increase in traffic volume over a wide area

Road development has been progressed as shown in Figure 1. According to the Country Index by the World Bank, freight transport volume in the Kazakhstan has increased from 2004 to 2009 at an average rate of 8.7% (Table 4). According to the Ministry of Transportation and Communications, the annual average

daily traffic that passed over this bridge en route on the national highway between Omsk, Russia, and the Chinese border (total distance: 1,060 km Figure 1) decreased from 4,403 vehicles a day in 2005 to 3,000 vehicles a day in 2011. However, this number still represented a significant increase compared to 1993, although the reason for the decrease is unclear. Most probably this is because of the new bridge, even though inter annual data is not available. Without the new bridge, large vehicles in particular cannot use this route, so the impact of the new bridge was confirmed.

Figure 1 Kazakhstan Regional Transportation Development Plan (2011-2014)



Source: Ministry of Transportation and Communications

Table 4 Domestic Cargo Transport Volume in Kazakhstan Unit: Million-ton km

	2004	2005	2006	2007	2008	2009
Domestic cargo transport volume	43,910	47,123	53,816	61,444	63.481	66.254

Source: World Bank, World Country Index

(2)Economic Indicator:

The Kazakhstani economy growth rate recovered to 7.3% in 2010 from the low of 1.2% in 2009 impacted by the Lehman shock in 2008.

Table 5 Economic Growth Rate of Kazakhstan Unit: %

	2005	2006	2007	2008	2009	2010	2011
Economic growth rate	9.7	10.7	8.9	3.3	1.2	7.3	7.5

Source: World Bank, World Country Index

Industrial output of Semey City has been on a recovering trend after 2010, despite a slight slowdown. Total Investment amount in Semey City was 34.7 billion tenge in 2011. A 51% increase from 2010, of which 16.4 billion was for industrial investment. This project also contributed to the industrial growth, with the increase of the number of large vehicles passing through the city transporting raw materials and products en route to other cities. This could not be achieved by using the pre-existing bridge since heavy trucks are not allowed to pass.

Table 6 Economic Indicators of Semey City
(Industrial output and Investment Amount (total, industry))

Unit: Million tenge

	2005	2006	2007	2008	2009	2010	2011
Industrial Output	33,678	38,185	60,165	78,682	82,553	94,953	109,517
Growth Rate (%)	-	13.4	57.6	30.8	4.9	15.0	15.3
Investment (Total)	13,694	9,832	14,631	19,819	20,942	22,984	34,777
Growth Rate (%)	-	-28.2	48.8	35.5	5.7	9.7	51.3
Investment (Industry)	2,734	4,657	7,057	7,834	12,623	14,295	16,432
Growth Rate (%)	-	70.3	51.5	11.0	61.1	13.2	14.9

Source: Semey City Statistics

Economic indicators and investment amount have tuned to growth though they were impacted by the global economic recession. Although there was a decrease in traffic volume in the wider area, the overall number is expected to still much higher than prior to the project. Therefore, it was confirmed at the time of ex-post evaluation that the project's impact also continued. .

3.2.2 Other Impacts

3.2.2.1 Impact on Natural Environment

No negative environmental impact is reported just as in the ex-post evaluation. Drainage water from the access roads was collected and sent to waste water treatment, while water on the bridge drained directly into the Irtysh River. Both the sanitation department of Semey City and the Semey Office of the Ministry of Environment conducted water quality test of the Irtysh River. According to the water quality test conducted in August 2010, it was confirmed that the quality of water met national environmental standards of all the 18 indicators at one water monitoring point 1km downstream of the new bridge. Monitoring points for noise and odour were not set around the new bridge. However, this may not be an issue due to

the fact that there have been no negative reports from local inhabitants.

3.2.2.2 Resettlement and Land Acquisition

The number relocated was 414 households and 7 corporations due to this project. Semey City did not identify the conditions of the relocated habitants and corporations after their relocation. Therefore, no new information was gathered related to the relocated person in this ex-post monitoring survey. Semey City reported that they have not received any claims.

3.2.2.3 Symbol of the Town

The bridge was identified as a new symbol of Semey City. So the bridge was introduced in the brochure of the city and on post cards. Some key holders and paperweights illustrating the bridge were found in the souvenir shops in the city.

3.2.2.4 Tourist Attraction

The number of European tourists visiting the bridge increased as the Asian Highway was developed.

It is observed couples took photographs for wedding ceremonies. So this bridge had been recognized as a tourist attraction.

Photo 2 Tourists Visiting the New Bridge

As mentioned above, the impact of this project continued in terms of increase in traffic volume in the wider area as well as stimulation of the local economy. Furthermore, new developments such as the bridge becoming a symbol of the city and a tourist attraction were newly observed and negative impact on the natural environment and social aspects was not confirmed.

3.3 Sustainability

3.3.1 Structural Aspects of Operation and Maintenance

At the time of the appraisal, the executing agency of the project was Semipalatinsk Region Akim Apparat (SOAA), and it was planned that the Project Implementation Unit (PIU) established under SOAA would become the operation and maintenance organization following completion of the project. In May 1997, SOAA was absorbed by East Kazakhstan Region Akim. PIU was also placed under the jurisdiction of East Kazakhstan Region Akim. However, no action was taken to make PIU the operation and maintenance organization after the project completion. Therefore, responsibility and structure of the operation and maintenance of the new bridge was not confirmed at the ex-post evaluation. Hence, recommendation was made to clarify the reason for delay of the handover procedure, to handover the facility and establish the operation and maintenance organization, to secure a sufficient budget and to handover equipment in proper management and usage.

In April 2008, Semey City received assets related to the new bridge and established "Multi purpose utilities enterprise operating Irtysh river suspension bridge" (Hereafter called the Operation and Maintenance Organization" by the instruction of East Kazakhstan Region (No K-86 dated April 15, 2008). PIU of the region was dissolved and handed over all the equipment and the maintenance manual to the Operation and Maintenance Organization. However, the handing over was not organized well according to the interview.

The reasons why the new bridge was transferred to the Semey City were because the bridge did not connect to any regional roads and the East Kazakhstan Region could not allocate budget because of non-existence of a budget code for regional operation.

The current organizational departments of the Operation and Maintenance Organization and the number of staff are summarized as listed below.

・Finance	5
・Personnel	1
・Administration	10
・Suspension Bridge	5
・Existing Bridge	5
・Manufacturing Technology	25
・Engineering	4

The organization tried to recruit highly qualified and skilled personnel as much as possible as shown by the fact that they hired graduates from civil engineering departments of universities into the suspension bridge group. However, it was difficult to hire qualified specialists with enough skill and knowledge, which cannot be acquired in university or specialized education. This is because the new bridge was the only large suspension bridge in the CIS countries at the time of construction. Furthermore, PIU staff, that was trained in the project, were not available for the Operation and Maintenance organization due to the fact that it took some time to hand over duties. Technological skill had not been transferred to the new company staff. As a result, staff members were forced to struggle with operation and maintenance activities from the start.

As the owner of the new bridge became clear the structure for operation and maintenance was also established as the operation and maintenance organization was set up. A number of technical staff was also hired despite a shortage of workers with technological knowledge and skill and progress was made from the time of ex-post project evaluation.

3.3.2 Technical Aspects of Operation and Maintenance

Simple daily maintenance was conducted at the time of ex-post evaluation. Recommendations from the ex-post evaluation were made concerning hand over and use of the manual. Such progress was observed in the ex-post monitoring survey.

Structural inspection was conducted annually, monthly and seasonally (Winter and Spring). Inspection planning also includes summer time and wintertime operation. The manual provided by the project includes type and item of operation and maintenance, operation flow and operation and maintenance structure. The management plan was prepared by using these manuals as indicated in the recommendation of ex-post project evaluation. However, the manuals were not comprehensive enough to cover all the operation and maintenance work as shown by the fact that the manuals lack the criteria of inspection activities, specification of consumables and repair materials. A Russian company prepared the manual related to an expansion joint when they repaired the bridge and that manual was widely used.

According to the enterprise, the number of the staff is enough to conduct current activities; however, there are concerns about their technical level. They have a request to dispatch experts from Japan to conduct training related to operation and maintenance of the suspension bridge. Following were their concerns and issues.

・Skill and knowledge of technical inspection, especially required for a suspension bridge
・Pavement of asphalt and concrete
・Inspection of tension on cables
・Repairing of an expansion joint


Photo 3 Repairing Pavement

Those technical gaps were identified from the beginning of the project. To cope with this, capacity development of the operation and maintenance was conducted in the project. As a result, technical gaps were narrowed after the implementation of the training. Although overall lack of skill was reported in the ex-post project evaluation, details were not identified. During the course of the ex-post monitoring, there was progress in that they identified challenges of technical skills required for sustainable maintenance, however the technical gaps were still not being closed. The reasons identified are as follows. Firstly, technical staff that were trained by the project did not remain in the operation and maintenance organization, corresponding to the handing over of maintenance body was changed from the region to the city and it was time consuming. Secondly, the manual prepared by the project was insufficient.

This lack of technical skills meant that technical staff could not understand comprehensive annual operation and maintenance activities. And it resulted in incomplete preparation of the document for requesting financial budget and it lead a lack of finance capability.

JICA has an ongoing cooperation program for the maintenance of Irtysh River Bridge from April 2012. Onsite training is planned to be conducted and the program is expected to solve some of the issues, though it cannot cover all the issues mentioned above.

3.3.3 Financial Aspects of Operation and Maintenance

The operation and maintenance company maintains other roads in the city as well. Semey City spent 11.4 million to 31 million tenge (almost equivalent to 7 million to 17 million JPY) annually for the road sector

budgeting from 2009 to 2011. Table 7 summarized the budget record on operation and maintenance of the new bridge among the road related budget.

Table 7 Budget Allocated to New Bridge Operation and Maintenance

Year	Operation Budget (Thousand Tenge)	Japanese Yen equivalent amount (Thousand Yen)
2008	3,345	2,960
2009	3,373	2,192
2010	3,270	2,044
2011	3,457	1,956
2012	3,716	2,022
Total	17,161	11,174
Average	3,432	2,235

Source: Financial Dept. Semey City, Multi-purpose utilities enterprise operating Irtysh river suspension bridge

Operation and maintenance budget for the Irtysh River Bridge was estimated at 1.62 million USD (equivalent to 136.9 million JPY at the exchange rate of the planned year) at the feasibility study. Average operation cost was 2.235 thousand tenge that was less than 2% of the planned amount shown in Table 7. From 2010 to 2012, Semey City's own budget was 7,700-10,144 million tenge (4,812 million JPY-5,518 million JPY), while road and transport budget was 525-1,008million tenge (328-548 million JPY). Semey City deputy Akimat said that it was not possible to allocate budget for the bridge maintenance based on the current budget structure, although this structure shall be reviewed.

Federal Ministry of Transportation and Communications also recognized the shortage of the budget of Semey City. Thus they requested about 2 million USD budget to the Ministry of Finance before 2010. However, there was no response from them.

3.3.4 Current Status of Operation and Maintenance

The Infrastructure Development Institute of Japan had dispatched a mission for the study of the new bridge in 2010. An inspection was made by the study team consisting of IHI Infrastructure Systems Co., Ltd (Former IHI) and Honshu-Shikoku Bridge Expressway Company Limited (HSBE). Summary of the results of inspection was shown as follows.

Photo 4 Unfixed Wire

1) Anchorages, main cables, cable band, hunger ropes, main towers: future rusting was concerned as traces of water flow were observed inside. Some painting was deteriorated.
2) Wind shoes, locker bearings: some painting was scratched off. Stiffing girder was de-centered (within the acceptable range)

3) Stiffening girder: not inspected.
4) Expansion Joint: repaired in 2001, part of sliding face was not cleaned.
5) Pavement on the bridge, guardrails: cracks were observed. It must be repaired annually. Some of the fence wire was not fixed.
6) Sidewalk: all the snow on the car lanes was accumulated. Removal of the snow was difficult since a park is located under the bridge.
7) Approach road: generally in good condition.

Based on the findings of this survey, physical condition of the bridge change was confirmed comparing with the time of ex-post evaluation as follows.

1) Foreseen rusting from water flow on the anchorages and main cables, which are important structures of the suspension bridge, will be a concern though not as much of a concern in the current condition. Further, measures shall be taken for deteriorating paint, accumulation of sand and dust on the sliding face.
2) Many cracks were observed on the pavement of the bridge. Fence wires of guardrails were not fixed. Further measures should be taken these sections as well.

In 2012, a structural soundness survey for the pre-existing bridge was planned to be conducted for the first time since 1998, based on the fact that the pre-existing bridge was severely aged and was in danger of collapse.

It shall be noted that there was great progress from the time of the ex-post project evaluation in terms of composition, technology and financial aspects of operation and maintenance, given the fact that the operation and maintenance organization was established, technical staff was hired and budget was allocated for maintenance. Furthermore, almost all recommendations were conducted. However, those were not enough to maintain the new bridge in good condition. Fortunately, no significant problem was observed in the soundness of the new bridge confirmed by the visual inspection in 2010, but improvement in the above-mentioned three aspects (structure, technology and finance) is expected.

3.4 Others

In the ex-post project evaluation, it was recommended to take temporary actions in consultation with Semey City, if it would take time to handover. Specifically, temporary actions were to address cost burden for inspection and maintenance borne by the Semey City and introduction of a speed limit for securing safety. Handover was completed and operation and maintenance organization was established at the time of ex-post monitoring and safety measures were taken, hence temporary measures are not required.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

Effectiveness of the Irtysh River Bridge at the ex-post monitoring was equal or superior to that of the

ex-post evaluation in terms of traffic volume increase, time saving and securing safety. Furthermore, positive impact was continuously observed as the bridge ensured the safe and smooth flow of traffic on a major trunk road and contributed to the stimulation of the local economy.

The issues at the time of ex-post evaluation were that assets were not handed over to the operation and maintenance organization and that no budget allocation was secured. Progress was found as responsibility became clarified among stakeholders and equipment and assets were handed over to the newly established operation and maintenance organization. However they faced new challenges. The manual handed over was not practical enough for them to conduct maintenance activities. Technical skill and knowledge of the staff in the organization was not enough because there was no special education organization for training in Kazakhstan. Furthermore, they could not make budget requests to Semey City, East Kazakhstan Region and the nation due to lack of technical skill and knowledge related to annual maintenance activities. Semey City's budget scale was also too small to allocate required resources for maintenance.

4.2 Recommendations

(To the operation and maintenance company)

Semey City: Suitable measures shall be selected and negotiated with the national government and regional authorities. It might be handing over the asset and the operation and maintenance organization to the nation.The priority shall be to secure budget source by subsidy.

(To Implementation agency)

JICA was recommended to promote Ministry of Finance and Ministry of Transportation and Communications to sustain the Operation and maintenance structure and acquire the budget. At the same time, it was also recommended to provide possible technical support under the ongoing technical assistance related to operation and maintenance.

4.3 Lessons Learned

Technical gap on the operation and maintenance aspects was significant as mentioned in the conclusion. This gap was identified from the beginning of the project. The project conducted capacity development component of the operation and maintenance. However, this large gap still exists.

For the implementation of the project, it shall be required to introduce appropriate technologies taking into account what capacity development activities for operation and maintenance could achieve, possibility of technology transfer from neighbouring countries and domestic resources as well as the possibility of entrusting to private companies.

After project commencement, once facilities and equipment hand over to a local authority, the implementation agency shall confirm not only formality of transfer but also actual capacity (personnel, technology and financing, etc.) of the handed-over authority for future smooth implementation. If that capacity is not enough, additional support from a central government or agencies shall be secured.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs		
1) Construction of new bridge	Steel suspension bridge length: 880 m, width: 34.27 m	Steel suspension bridge length: 1,086 m, width: 35 m
2) Construction of approach road	length: 750 m, width: 35.77 m	length: 1,564 m, width: 38.5 m
3) Improvement of access road	length: 6,900 m (right bank: 3,400 m, left bank: 3,500 m)	length: 6,837 m (right bank: 3,855 m, left bank: 2,982 m) Additional: parking lot, overpass, left-turn lane, flood plain improvement, etc.
4) Other construction	N.A.	Foreign: 370 MM
5) Consulting services	Foreign: 439 MM Kazakhstani: 1,026 MM	Kazakhstani: 1,258 MM
2.Project Period		
1) L/A signing	February 1997	March 1997
2) Resident relocation	March 1997–February 1998	March 1997–May 1998 December
3) Consultant selection	December 1996–March 1997	1996–March 1997
4) Service provision	April 1997–October 2002 April	April 1997–October 2002
5) Bidding	1997–December 1997 January	May 1997–December 1997 January
6) Contracting	1998	1998
7) Detailed design	January 1998–June 1998	January 1998–June 2002
8) Construction	April 1998–February 2000	April 1998–November 2001
9) Completion and opening of bridge	October 2001	November 2000
3.Project Cost		
Amount paid in Foreign Currency	21,530 million yen	21,236 million yen
Amount paid in Local Currency	6,791 million yen (4,271 million tenge)	8,728 million yen (10,148 million tenge)
Total	28,321 million yen	29,964 million yen
Japanese ODA Loan Portion	21,530 million yen	21,236 million yen
Exchange Rate	1 tenge=1.59 yen (as of October 1996)	1 tenge =0.86 yen (average of 1997–2006)

【Ex-post Monitoring of Completed ODA Loan Project】

Mongolia

"Baganuur and Shivee-Ovoo Coal Mine Development Project (1) (2)"

External Evaluator: George Terahara

(International Development Center of Japan, Incorporated)

1. Project Description

Map of the Project Area

1.1 Project Objective

The project objective was to increase coal production capacity to meet coal demand in Mongolia and improve the quality of coal to satisfy the needs of power plants by revamping the Baganuur Coal Mine, the largest coal mine in the country, and expanding the Shivee-Ovoo Coal Mine, thereby contributing to economic development.

1.2 Outline of the Loan Agreement

Approved Amount/ Disbursed Amount	(1) Phase 1 5,827 million yen / 5,820 million yen (2) Phase 2 4,298 million yen / 4,218 million yen
Loan Agreement Signing Date/ Final Disbursement Date	(1) Phase 1 February 1997 / May 2002 (2) Phase 2 February 1998 / March 2005
Ex-Post Evaluation	FY 2006
Executing Agency	Baganuur Joint Stock Company (BJSC)・ Shivee-Ovoo Joint Stock Company (SOJSC)
Main Contractor	(1) Montechmash JVC (Mongolia), Neyon Co. Ltd. (Mongolia), Burvodservice Co. Ltd. (Mongolia), Konoike Construction (Japan), Wagner Asia Equipment Co. Ltd. (Mongolia), Itochu Corporation (Japan), ECS International PTY Ltd, Bowral NSW (Australia) (JV)

	(2) Itochu Corporation (Japan), Konoike Construction Co., Ltd. (Japan), AGT Trade Co. Ltd. (Mongolia) (JV)
Consultant	(1) Taiheiyou Coal Mine (Japan) / The Institute of Energy Economics, Japan (JV) (2) Taiheiyou Coal Mine (Japan) / The Institute of Energy Economics, Japan (JV)

1.3 Background of Ex-post Monitoring

Although coal had been an important energy source in Mongolia, financial assistance from the former Soviet Union stopped after its collapse and the deterioration of coal mining/soil removing equipment stood out and production rate lowered at the time of appraisal. An increase in the production of high quality coal in order to stabilize living conditions and to support economic development was needed. The reality was, however, that insufficient coal production capability jeopardized the stable supply of electricity and heat as essential energy sources. In spite of the critical need to maintain and increase coal production capacity, the weakness of the private sector and the instability of the national economy made it difficult to implement coal mine development projects financed by private funds utilizing investment from overseas, etc. Therefore, coal mine development through public investment progressed and a loan from World Bank and Japanese Yen Loan financed the capital investment.

At the time of appraisal, it was deemed necessary to increase the production of the Baganuur Coal Mine from 3 million tons a year to 4 million tons a year and that of the Shivee-Ovoo Coal Mine from 0.3 million tons a year to 2 million tons a year in order to meet the expected increase in demand. However, due to the limitation of the fund, and the fact that procurement of excavating equipment required at the Shivee-Ovoo Coal Mine would take time, the project was divided into two phases. In Phase 1, the purchase and stockpiling of materials and equipment urgently needed for the revamping of the Baganuur Coal Mine and maintenance of the Shivee-Ovoo Coal Mine was planned and it increased the annual coal production of the Shivee-Ovoo Coal Mine to 1 million tons. In Phase 2, it procured the necessary materials and equipment with the target of increasing the annual coal production of the Shivee-Ovoo Coal Mine to 2 million tons.

Although project costs were almost as planned, the project period was much longer than planned (183% of planned period for Baganuur and 207% for Shivee-Ovoo) at the time of post evaluation of the project; therefore the post-evaluation judged the efficiency was moderate. Both coal mines prepared the coal handling plants (CHP) and mining equipment as planned and although actual annual coal production volume (total 4.01 million tons, 2005) did not reach the initially planned volume (6.00 million tons), it was close to the revised planned volume (revised to 4.20 million tons in 1998) because of stagnant coal demand. Thus, the effectiveness of the project was judged to be moderate. In addition, the both mining companies still had financial concerns and sustainability was

also judged to be moderate. In total, the result of post-evaluation was low. Furthermore, the post-evaluation recommended to the two mining companies to conduct greater effort in their management practices such as realization of increasing coal production volume and sales amount, expansion of sales channels and early recovery of accounts receivable.

Consequently, the Project became subject to Ex-Post Monitoring in order to review and verify the current conditions from the ex-post evaluation onwards. The Project was reviewed with distinct evaluation criteria, especially focused on sustainability, based on the results of the questionnaire survey and others and a conclusion was derived.

2. Outline of Survey

2.1Survey Schedule

Survey Period: January 2012-October 2012

Field Survey Period: None

2.2 Constraints of Monitoring

Field survey was not conducted.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

3.1.1.1 Indicators of Operation and Effects

(1) Operational Status of Procured Equipment

This project procured coal mining equipment and Coal Handling Plant (CHP), etc. The current operational status of equipment is shown as below:

(a) Baganuur Coal Mine

Table 1 Current Operational Status of Equipment at Baganuur Coal Mine

Equipment	Procured Number	Current Operational Number (2012)	Condition, comment, etc.
1. Coal Mining Equipment			
Bulldozer	17	10	Breakdown and worn out
Truck (40t)	10	5	Break down and worn out
Dump truck (90t)	20	8	Break down and worn out
Trailer	2	1	Worn out
Crane	3	2	Worn out
Other equipment	6	3	Worn out
2. Coal Handling Plant	2	2	Operational
3. Spare Parts	For 3 years		
4. Other related machines and equipment	4		

Note: Procured number includes the World Bank financed portion.

Source: BJSC

Among coal mining equipment, approximately half of the vehicles procured by this project are still currently operational (Table 1). Considering the statutory useful life, seven years, of coal mining vehicles in Japan, the vehicles are being sufficiently utilized. Two CHPs are also operational.

(b) Shivee-Ovoo Coal Mine

Table 2 Current Operational Status of Equipment at Shivee-Ovoo Coal Mine

Equipment	Procured Number	Current Operational Number (2012)	Condition, comment, etc.
1. Coal Mining Equipment			
Bulldozer	4	3	Worn out
Truck	16	16	Operational
Grader	2	2	Operational
Crane	1	1	Operational
Hydraulic excavator	2	2	Operational
Wheel Loader	1	1	Operational
Wheel Pusher	1	1	Operational
Road sprinkler	1	1	Operational
Rock drill	2	2	Operational
Loader (small)	1	1	Operational
Electric excavator	1	1	Operational
Excavator	1	1	Operational
Coal conveyor	1	1	Operational
Sprinkler truck	1	1	Operational
2. Drainage Treatment System	1	1	Operational
3. Coal Handling Plant	1	1	Operational
4. Other related machines and equipment and repair facilities (icluding installation of power transmission lines, etc.)	1	1	Operational
5. Spare Parts	For 3 years		

Source: SOJSC

Most of the equipment is operational. Specifically, the three out of four granted bulldozers and all 16 trucks are operational. The vehicles are being sufficiently utilized according to the statutory useful life of seven years mentioned above.

(2) Coal Production Volume and Sales Channels

Table 3 Major Production Indicators of Both Mines

Baganuur	Unit	1997 (Before Project)	2000	2001	2002	2003	2004	2005 (Ex-post Evaluation)	2006	2007	2008	2009	2010	2011
Coal Production	1,000t/yr.	2,972	3,069	2,874	3,093	3,046	2,711	2,811	2,761	2,741	3,000	3,007	3,395	3,253
CHP Handled Volume	1,000t/yr.			1,107	2,294	2,532	2,254	2,549	2,804	2,828	2,986	3,018	3,408	3,264
CHP Handled Rate	%			39%	74%	83%	83%	91%	102%	103%	100%	100%	100%	100%
Water Content Rate	%		34.0	34.7	35.1	35.0	34.1	35.2	35.5	35.4	35.6	36.9	37.1	37.4

Shivee-Ovoo	Unit	1997	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Coal Production	1,000t/yr.	222	603	857	932	941	1,309	1,254	1,304	1,379	1,478	1,418	1,671	1,578
CHP Handled Volume	1,000t/yr.			272	897	902	1,241	1,243	1,307	1,416	1,451	1,403	1,767	1,586
CHP Handled Rate	%			32%	96%	96%	95%	99%	100%	103%	98%	99%	106%	101%
Water Content Rate	%		47.1	47.1	46.9	45.8	45.4	41.8	42.2	42.1	42.0	42.0	42.1	42.7

Source: Both Mining Companies

Before the project, not only was coal production volume at both mines lowered due to outdated equipment and shortages of equipment, but the mines could not supply the quality and quantity of coal required by power plants. After the project, although coal production capacity increased, demand for coal did not increase enough to match the planned volume (Baganuur 4 million tons a year, Shivee-Ovoo 2 million tons a year) at appraisal and the planned volume was revised downward in 1998 (Baganuur 3 million tons a year, Shive-Ovoo 1.2 million tons a year). The coal production volumes of both coal mines reached the revised planned volumes (Table 3).

(a) Baganuur Coal Mine

The completion of this project increased the annual production capacity from 3 million tons to 4 million tons and the actual production volume in 2008 and after reached 3 million tons, which is the revised planned volume in 1998.

Baganuur Coal Mine supplies its coal to Mongolia Central Energy System which includes Ulan Bator Second to Fourth Coal-fired Power Plant, Erdenet Coal-fired Power Plant and Darkhan Coal-fired Power Plant in 2012.

(b) Shivee-Ovoo Coal Mine

The completion of this project increased the annual production capacity from 0.3 million tons to 2 million tons and the actual production volume in 2005 and after reached 1.2 million tons, which is the revised planned volume in 1998.

Shivee-Ovoo Coal Mine supplies its coal to Ulan Bator Fourth Coal-fired Power Plant and local users in 2012. In accordance with the increase of such demand, the annual production volume increased slightly and is maintaining at about 1.6 million tons annually.

Although the post-evaluation recommended management measures including expansion of sales channels, the both mine provide coal mainly to the power plants in Ulan Bator as mentioned above and there is a plan to provide coal to the Fifth Coa-firedl Power Plant, which is planned to be constructed (described later), after it is completed.

(3) Handled Volume of CHP

Table 3 shows that processed volumes of CHP are increasing in both mines in line with the rate of increase in coal production. Recently, the process rate is close to 100%.

(4) Water Content of Coal

As the water content in coal increases, the calorific heating value at combustion is lowered leading to a lower coal price. Thus, the water content in coal is an important indicator for quality management. Table 3 shows the water content of Baganuur coal was 34.0% in 2000, before the

project, and increased to 37.4% in 2011. Baganuur Coal Mine has attempted to lower the water content by underground well and drainage, but it has not been effective. The water content is, however, within the appropriate range according the post evaluation report. Shivee-Ovoo coal contains more water than Baganuur coal in general. The water content of Shivee-Ovoo coal slightly decreased from 47.1% (2000, before Project) to 42.7% (2011), showing the effects of efforts such as thorough removal of groundwater and extension of drying time in the coal yard.

(5) Miniaturization of Coal Size

Before the project, Baganuur Coal Mine had the problem that it could not provide the size of coal required by power plants because of an outdated coal crusher. By using a new coal crusher procured by the project, the mine currently can provide coal sized 200mm or smaller and meets the Mongolian National Standard (BJSC).

3.1.1.2 Internal Rate of Return (IRR)

Appraisal and ex-post evaluation calculated Financial Internal Rate of Return (FIRR) by assuming new and renewed investment (inclusive of the co-finance portion by the World Bank and local currency portion for the investment cost), operational cost and tax cost, coal sales revenue as the benefit and project life as 20 years. Economic Internal Rate of Return (EIRR) excludes the tax from the cost item above. The following calculation is conducted based on similar items as above.

Table 4 Change of Internal Rates of Return

Coal Mine		At appraisal (1997)	At Ex-post Evaluation (2006)	At Ex-post Monitoring (2012)
Baganuur	FIRR	6.8%	5.8%	Negative
	EIRR	33.1%	29.8%	Negative
Shivee-Ovoo	FIRR	5.8%→5.2%	Negative	1.1%
	EIRR	15.2%→13.7%	4.3%	1.1%

Source: Ex-post Evaluation and Ex-post Monitoring

Note: Arrow symbol (→) expresses the change from Phase 1 to Phase 2 appraisal.

Because the coal price did not rise substantially, coal production volume was also significantly lower than supposed at the time of the appraisal, and operational cost was high, all IRRs resulted in low values.

3.1.2 Qualitative Effects

Because the ex-post evaluation did not measure qualitative effects especially, this Monitoring Survey does not compare those and will not indicate them as well.

The above facts show the further improvement of effectiveness in coal production volume and

CHP handling volume from the time of ex-post evaluation. On the other hand, the expression of effectiveness of water content in coal remains at a similar level as the time of ex-post evaluation.

3.2 Impact

Table 5 Change in the Number of Accidents and Cases of Illness at Both Mines

Baganuur	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of Accidents	15	3	4	2	0	0	1	1	0	2	1
Number of Fatal Accidents	1	0	0	0	0	0	0	1	0	2	0
Number of Pulmonary Disease Case	10	8	10	8	7	6	4	6	5	4	4

Shivee-Ovoo	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of Accidents	0	0	0	2	6	1	1	1	0	3	2
Number of Fatal Accidents	0	4	0	0	0	0	0	0	0	0	0
Number of Pulmonary Disease Case	1	0	0	2	1	1	0	2	1	1	0

Source: BJSC and SOJSC

3.2.1 Intended Impact

3.2.1.1 Reduction of Accidents

Baganuur Coal Mine had fatal accidents even after 2007 (Table 5). Shivee-Ovoo Coal Mine experienced its last fatal accident in 2002. Although some accidents occurred even after the project, the maximum number is limited to a low figure of two per year (Baganuur, 2010) after implementation of the project. New equipment introduced by the project contributed to the improvement of operational safety.

3.2.1.2 Reduction of Pulmonary Disease Cases

Compared with the year 2001, before the project, Baganuur saw a decrease in the number of pulmonary disease cases from four to six, after the project was implemented in 2006. Equipment newly introduced through this project contributed to the improved operational environment at Baganuur.

Shivee-Ovoo had zero to two pulmonary disease cases annually and this has not changed significantly between pre and post project.

3.2.1.3 Coal Consumption Volume at Power Plants and Coal Demand and Supply Trend

Ministry of Mineral Resources and Energy estimated that total coal demand would increase in power generation and export. Among them, thermal power plants in Ulan Bator occupy a large part of market demand for both mines and coal supply from both mines is increasing gradually.

In accordance with the increase of power demand, existing power plants cannot supply all the power demand and Fifth Combined Heat and Power Plant, a new power plant, is planned. The Power Plant was examined in a Feasibility Study (FS) supported by Technical Assistance (TA) of the Asian Development Bank (ADB) and the government recruited an Independent Power Producer (IPP) from the private sector. The government decided to progress with the construction of the power

plant through Government Decision Number 44 in February 2012. The second stage selection was conducted in May 2012 and a consortium of four companies, Sojitz (Japan), International Power GDF Suez (France), Posco Energy (South Korea) and NEWCOM (Mongolia) won the priority negotiation right in July 2012 (Sojitzu Press Release July 6, 2012). After the completion of the Power Plant, both mines are expected overall to supply coal to the Power Plant.

Production capacity of both mines is larger than current supply amount and both mines can produce more coal if demand increases. Ulan Bator experiences blackouts caused by failures at thermal power plants, but coal supply is sufficient. Thus, the project of both mines contributes to the stable supply of electricity.

3.2.2 Other Impacts

3.2.2.1 Impact on Natural Environment

In Mongolia, Natural Environment Protection Law in 1995 and Natural Environment Impact Assessment Law in 1998 (revised in 2001) provides the basic framework for natural environment measures. The former Law applies strict environmental measures such as reduction of environmental impact during coal mining and restoration of former surface mining sites. However, the latter Law does not target for the coal sector.

Both mining companies conduct environment measures based on Natural Environment Protection Law. BJSC tries to protect dust expansion by watering on the truck roads. The Mine also performs backfill and tree planting activities at former excavated sites since 1999. The backfill area reached 127.5ha in 2009 and 109.1ha of them was planted. SOJSC prepares Environmental Protection Plan annually and conducts environmental protection measures based on it. The Plan in 2010 had 17 programs of 12.80 million MNT included protection of dust expansion, monitoring of dust density and noise level, measurement of sulphur dioxide and nitrogen dioxide in the air, and tree planting in 3ha. SOJSC planted trees on 9.5 ha of former surface mining sites from 2003 to 2009.

By these facts, it is judged that the two mines are conducting sufficient mitigation measures as of now against negative effects on the natural environment.

3.2.2.2 Resettlement and Land Acquisition

This project introduced new equipment to existing coal mines and there were no issues related to resettlement of local residents and land acquisition.

3.2.2.3 Other Impact

None

By these facts, the positive impact from this project is continuously appearing through the stable supply of coal as an energy resource for power generation. In addition, because the number of

accidents and cases of pulmonary disease has been kept at a level as low as at the time of ex-post evaluation, it is judged that there is no distinct problem on impact.

3.3. Sustainability

3.3.1 Structural Aspect of Operation and Maintenance

At the time of appraisal, the Ministry of Infrastructure Development was the government body in charge of the project. It changed to Ministry of Infrastructure in 2002 and Ministry of Fuel and Energy in 2004. Finally, the current Ministry of Mineral Resources and Energy (MMRE) took charge of the project. Within the Ministry, the Fuel Policy Department is responsible for the project.

The operations and maintenance organization of Baganuur Coal Mine is Baganuur Joint Stock Company (BJSC), a joint-stock corporation of which 75% is owned by the government and 25% is owned by the private sector. The project implementation organization of Shivee-Ovoo Coal Mine is Shivee-Ovoo Joint Stock Company (SOJSC), a joint-stock corporation of which 90% is owned by the government and 10% is owned by the private sector. Both companies are listed on the Mongolian Stock Exchange.

A Mongolian law requires the government to own 51% or more of stock of mining companies and a working group of MMRE is considering to lower the government stock holding share in both joint companies to 51%, the minimum requirement by law according to MMRE's answers to the Questionnaire.

In April 2012, State Property Committee recruited an underwriter for new public offering of 60 billion MNT to reduce the government stock holding share in BJSC to 51%[1].

Thus the Government is progressing with reforms in the direction to reduce the stock holding share of both mines to 51% through the new public offering. The reform process of BJSC has already been decided and launched. On the other hand, the coal supply obligation and coal price decision process by the government has not changed.

3.3.2 Technical Aspect of Operation and Maintenance

Both mining companies regularly conduct examinations to measure the skill levels of staff. Current staffing at both mines is as follows:

BJSC has nine engineers and 1070 miners.

SOJSC has 95 engineers and 409 miners. They are classified as follows based on technical level:

Engineers: A grade 8, B grade 36, C grade 27, D grade 12, E grade 12.

Miners are classified as follows:

A grade 21, B grade 36, C grade 120, D grade 227, F grade 5.

(according to each company's answer to the questionnaire.)

Although there is not sufficient information on the technical level classification, each company

[1] businessweek.com Article on April 16, 2012.

has clear guidelines for technical standards of engineers and miners and implements these. Thus, the technical level specifications at each mine are judged to be kept at a level similar to that at the time of ex-post evaluation.

3.3.3 Financial Aspect of Operation and Maintenance

3.3.3.1 Outline of Financial Situation

(1) Baganuur Joint Stock Company

Table 6 Change in Profit and Loss of BJSC

Unit : 1,000MNT

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sales Revenue	28,076,564	25,848,357	31,827,540	31,936,659	34,308,076	43,174,035	49,483,138	62,545,947	66,040,550
Cost of Sales	24,630,645	24,417,580	26,380,062	27,512,982	34,781,409	40,732,263	44,226,970	55,304,095	61,018,121
Other Cost	4,065,135	-4,332,013	5,928,564	4,955,416	-7,656,273	-8,634,641	-3,864,812	15,353,957	105,170
(Foreign Exchange Gain/Loss)	-4,831,623	-2,946,103	-8,937	-5,010	-210,415	-5,762,953	-8,537,161	9,847,714	-7,822
Pre-Tax Profit/Loss	619,216	-5,762,790	481,086	531,739	-7,182,940	-11,076,413	-9,120,980	8,112,105	-4,917,259
Tax	400,000	0	272,974	265,177	1,343	131	0	19,388	3,182
After Tax Profit/Loss	219,216	-5,762,790	208,112	266,562	-7,184,283	-11,076,544	-9,120,980	8,092,717	-4,920,441

Source: BJSC

According to Table 6, cost of sales is 90% or more of cost against revenue from the coal. In addition, there are other costs, inclusive of foreign exchange gain/loss due to yearly fluctuations of rates, which in turn causes After Tax Profit/Loss to fluctuate greatly as well.

In fiscal year 2010 and 2011, the After Tax Profit/Loss reached 8.09 billion MNT in black (profit) and 4.92 billion MNT in red (loss) respectively. As a breakdown of cost, profit/loss from fluctuation of foreign exchange rate[2] saw a profit of 9.85 billion MNT in 2010 causing After Tax Profit/Loss to be in the black, but the same profit/loss from foreign exchange rate saw a loss of 8 million MNT in 2011. Even excluding the loss caused by the foreign exchange, pre-tax profit/loss fluctuates between surplus in some years and deficit in others.

BJSC incurs annual maintenance costs of 4.10 million to 26.06 million MNT (based on the actual expenses from year 2003 to 2011).

(2) Shivee-Ovoo Joint Stock Company (SOJSC)

Table 7 Change in Profit and Loss of SOJSC

Unit: 1,000MNT

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Revenue	5,898,335	5,474,746	7,801,844	9,464,151	11,269,007	11,176,397	15,142,094	16,982,358	36,860,761	24,653,718
Sales Cost	5,148,076	5,921,729	7,766,420	10,290,983	10,813,256	10,476,728	13,586,193	14,614,953	21,799,030	25,374,378
Operating Cost	116,031	142,342	171,892	170,569	232,242	276,049	425,986	533,603	732,161	1,057,155
Other Cost	383,972	444,301	501,276	699,591		990,078	7,404,715	12,881,451	1,761,487	625,980
Before Tax Profit/ Loss	250,256	-1,033,626	-637,744	-1,696,992	223,509	-566,458	-6,274,800	-11,047,649	12,568,083	-2,403,795
Tax	5,464						42,860			
After Tax Profit/ Loss	244,792	-1,033,626	-637,744	-1,696,992	223,509	-566,458	-6,317,660	-11,047,649	12,568,083	-2,403,795

Source: SOJSC

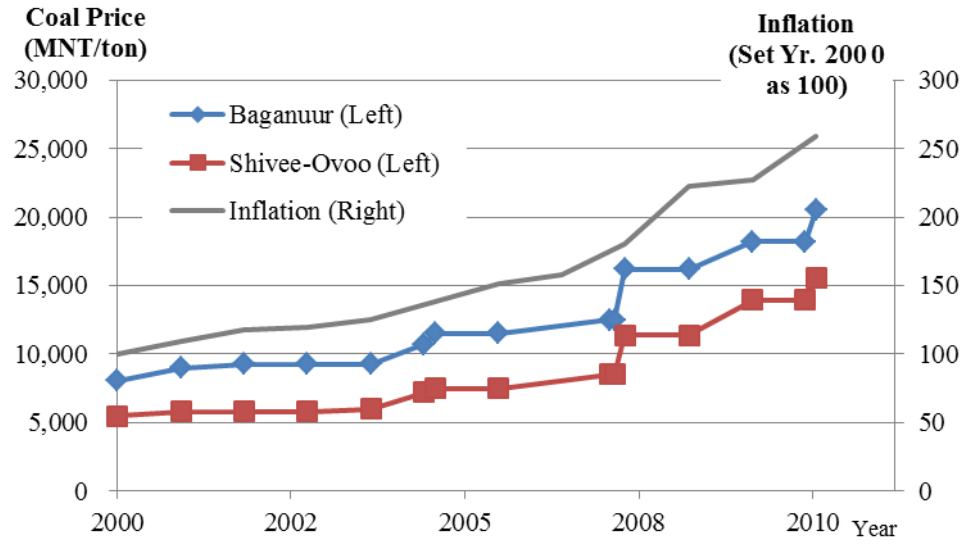
[2]There was no answer for the cause of foreign exchange profit and loss and its countermeasures from either company and so it is unknown.

According to Table 7, the operating cost is very high against revenue from coal sales. Especially the cost exceeds the revenue itself in fiscal year 2005 and 2011. In addition, ordinary cost (inclusive of foreign exchange profit and loss) and other cost are so high, that the final After Tax Profit/Loss is not as stable as that of BJSC.

SOJSC includes the maintenance cost in the sales cost and the actual maintenance cost is not clear.

Therefore, both companies have increasing sales revenue, but the cost, inclusive of foreign exchange loss is also rising. Consequently, this did not lead to improvement in profit/loss and financial stability. The necessary maintenance cost is, however, judged to be expended sufficiently.

3.3.3.2 Coal Price



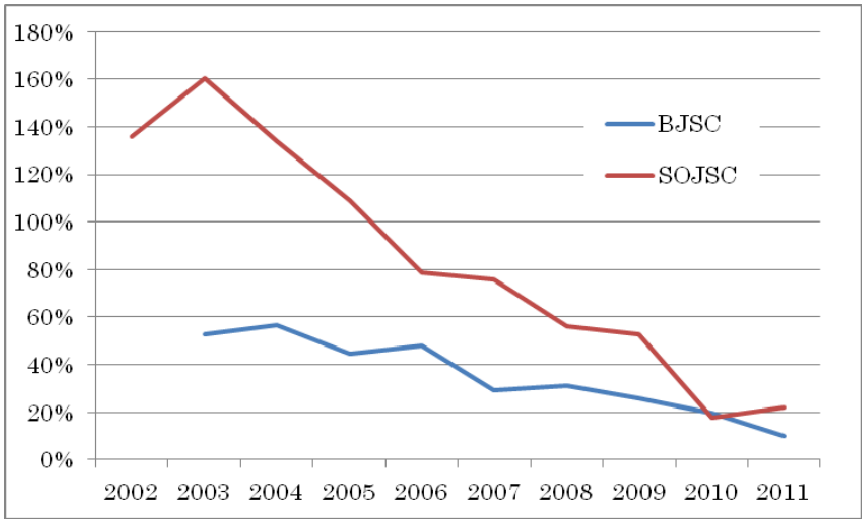
Source: Coal price; both companies. Inflation; IMF Economic Outlook

Figure 1 Change in Coal Price and Inflation

As shown in Figure 1, the coal price rose about 2.5 times over these ten years. Nonetheless, the price followed the inflation of the ten years (right axis, accumulated by the base year of 2000 as 100), and the actual coal price did not change if the influence of inflation is excluded. In addition, because the water content in coal was not significantly reduced, the coal calorie did not rise. Consequently, the coal price based on the calorie did not increase either.

Increase in coal production volume and coal price (however, coal price is almost proportional to inflation) from the time of ex-post evaluation led to increase in sales revenue of both companies. The coal price was assumed to be liberalized at the time of appraisal, but the pricing is still under the government decision process in 2012.

3.3.3.3 Accounts Receivable



Source: BJSC and SOJSC

Figure 2 Change in Accounts Receivable per Sales

Figure 2 shows the steady progress on collection of accounts receivable. Especially, BJSC, which had accounts receivable of 161% against sales in 2003, decreased the number to around 20% (equal to almost 2.5 months of sales) in 2011. These were made possible by the contract revision and collection efforts (answer from BJSC). This means that management efforts of both companies, such as early collection of accounts receivable, recommended by the ex-post evaluation has been steadily realized.

3.3.4 Current Status of Operation and Maintenance

Both mining companies are regularly conducting operation and maintenance of their respective coal mines. However, because years have passed since the purchase of equipment and some equipment has been used beyond the useful life, there have been many breakdowns and problems. Although equipment was to be updated as part of the investment, due to the remaining limited budget of the investment, the equipment renewal is not progressing for lack of sufficient funds. Although SOJSC prepares a list of equipment that will be needed in the near future, the fund procurement plan is unknown.

Even under such a situation, the production volume is maintained and increased. Thus, the situation of operation and maintenance is considered to be good at both mines.

Thus, it is confirmed that both mining companies properly secured operation and maintenance and there is no special problems with structure or technology. On the other hand, the high operating cost including operation and maintenance cost is leading to deterioration of After Tax Profit/Loss. Since there seems to be no budget to spare for new and renewed investment, some concerns remain in financial sustainability.

4. Conclusion, Recommendation and Lesson Learned

4.1 Conclusion

The results of this project saw significant increases in coal production volume and sales amount, and CHP volume from the time of post evaluation. The number of accidents and cases of pulmonary diseases also remain the same as the time of ex-post evaluation. Recommendations, such as a coal price increase (however, mostly proportional to inflation) and early collection of accounts receivable made by the ex-post evaluation were realized. Although the government continues to hold the major share of both companies, consideration to lower the stock holding share is underway and After Tax Profit/Loss was still in the red in some fiscal years. Therefore it cannot be concluded that the financial situation improved and some concerns remain with financial sustainability.

4.2 Recommendation

(MMRE)

The Ministry should show a longer term and more specific vision and perspective for introducing private involvement in the energy sector to achieve stable energy supply, etc.

Although the policy to liberalize coal prices was set at the time of appraisal, the coal price was set low and the financial situation of both mining companies did not improve. In case the government reduces its involvement in both companies by lowering the stock holding share, etc., then on the other hand, reform of coal prices (price itself and its decision mechanism) and liberalization of sales channels should also be advanced.

(BJSC and SOJSC)

Because the increase in coal production volume has not led to increase in after tax profit, the companies should progress with reduced production cost, negotiate to increase the coal price, and expand the sales channels in order to stabilize the management.

4.3 Lessons Learned

None.

Comparison of Planned and Actual Scope

Item	Planned	Actual
Baganuur Coal Mine		
1) Output		
1.Coal Mining Equipment		
Bulldozers, Trucks etc.	55	As planned
2. Coal Handling Plant (CHP)	2	Almost as planned (design changed)
3. Spare Parts	For 1.5years	As planned
4. Other related machines and equipment (testing equipment, etc.)	4	As planned
5. Consulting Service	36MM	58MM
2) Project Period	February 1997-December 1999 (2 years 11 months)	February 1997-May 2002 (5 years 4 months)
Shivee-Ovoo Coal Mine		
1) Output		
1. Coal Mining Equipment		
Bulldozers, Trucks etc.	35	As planned
2. Drainage Treatment System	1	As planned
3. Coal Handling Plant	1	Almost as planned (design changed)
4. Other related machines and equipment (repair facilities, installation of power transmission lines, etc.)	1	As planned
5. Spare Parts	For 3 years	As planned
6. Consulting Service	38MM	38MM
2) Project Period	February 1997-Septem-ber 2001 (4years 8 months)	February 1997-March 2005 (8 yeras 2 months)
Both Mines		
3) Project Cost		
Foreign Currency	13,975 million yen	12,886 million yen
Local Currency	697 million yen	834 million yen
Total	14,672 million yen	13,720 million yen
ODA yen loan portion	10,125 million yen	10,039 million yen
Exchange Rate	1 yen = 4.83MNT	1 yen = 8.48 MNT