Kingdom of Thailand

Ex-Post Evaluation of Japanese ODA Loan Project
Industrial Ring Road Construction Project

Yasuhiro Kawabata, Sanshu Engineering Consultant

1. Project Description

Location of Project Site

Chao Phraya River Crossing Bridge

1.1 Background

The southern and western area adjacent to the project site in the Metropolitan Bangkok was particularly designated as an industrial zone of Samut Prakarn District. Its development as an industrial zone has been promoted although the economic development attained during late 80s through early 90s (the GDP growth rate was about 10 percent) was not expected. Bangkok Klongtoey Port, located in the north of the project site, was a hub port for transporting materials to be used and products completed in the above industrial zone and has been handling the largest amount of cargoes, even though it is a river port. It was strategically an important area, which could handle cargoes, particularly industrial materials and products used or completed in Bangkok and its vicinities.

At the time of appraisal (1997), there was no bridge crossing the Chao Phraya River toward downstream from the existing Rama IX Bridge. The only mode connecting both banks was a ferry. The road connecting Bangkok Port and the industrial zone in the Samut Prakarn District has one lane in each direction, and Rama IX Bridge and roads around ferry terminals have been heavily congested attributing to trucks traveling between the industrial area and Bangkok Port. There was daily traffic congestion along the corridor connecting the industrial area in Samut Prakarn District and Bangkok Port along Chao Phraya River due to lack of capacity of roads, bridges and ferries, and the transport efficiency for cargo and passengers has substantially declined. By connecting the North South Road with Bangkok Outer Ring Road, which traverses in the south of the project site, roads were also expected to function as part of the Bangkok road

network.

1.2 Project Outline

The project objective is to contribute to the economic development in the southern Bangkok by alleviating traffic congestion, enhancing transport efficiency, and improving the road network by constructing Chao Phraya River crossing bridges, improving the existing old railway road, and constructing the extended segment to the Bangkok Outer Ring Road in the Samut Prakarn District in Metropolitan Bangkok. The location of the project site is shown in Figure 1.

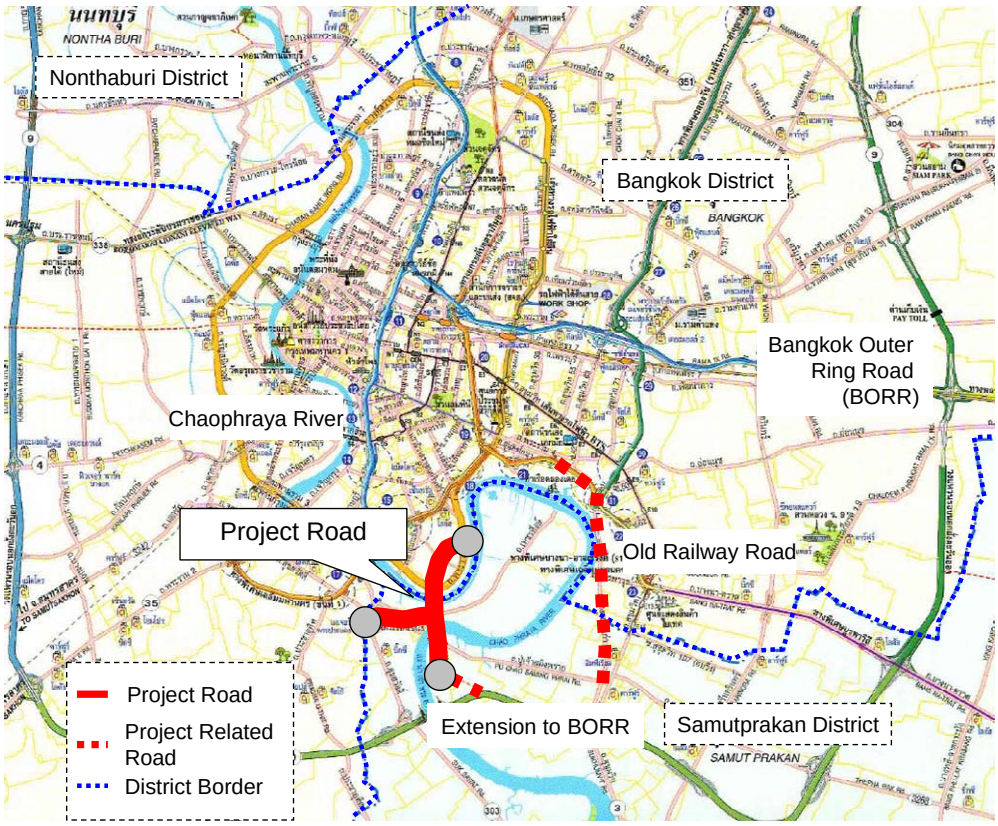

Figure 1 Location of Project Site

Approved Amount / Disbursed Amount	14,887 million yen / 14,886 million yen
Exchange of Notes Date / Loan Agreement Signing Date	September 1997/ September 1997
Terms and Conditions	Interest Rate: 2.7%; Repayment Period: 25years (Grace Period: 7 years) ; Conditions for Procurement: General Untied
Borrower / Executing Agency	The Government of Kingdom of Thailand / Department of Rural Roads, Ministry of Transport[1]
Final Disbursement Date	January 2008
Main Contractors (Over 1 billion yen)	Kajima Construction Co. Ltd. (Japan)/Tokyu Construction Co. Ltd. (Japan)/Unique Engineering and Construction Co. Ltd. (Thailand) (JV), Nishimatsu Construction Co. Ltd. (Japan) /Taisei Construction Co. Ltd. (Japan)/Nippon Steel co. Ltd. (Japan)//Sino-Thai Engineering and Construction Public Co. Ltd. (Thailand) (JV)
Main Consultant (Over 100 million yen)	None
Feasibility Studies, etc.	F/S by Department of Public Works, Ministry of Interior (January 1996)
Related projects	None

2. Outline of the Evaluation Study

2.1 External Evaluator

Yasuhiro Kawabata, Sanshu Engineering Consultant

2.2 Duration of Evaluation Study

Duration of the Study: December 2009 – November 2010

Duration of the Field Study: March 21 – 27, 2010 and May 8 – 17, 2010

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

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Thailand

Following the financial crisis in July 1997, Thailand's 8th National Economic and Social Development Plan focused on the following four agenda: (1) reconstruction of economy and assurance of stability; (2) alleviation of impacts to the people; (3) reform the economic

[1] Originally, the executing agency was the Public Works Department (PWD) of the Ministry of Interior. However, due to reorganization of the Thai central government in October 2002, the responsibility for the project was transferred to the Department of Rural Roads of the Ministry of Transport.

structures; and (4) establishment of superior government. Under such social and economic conditions, development projects in Bangkok Metropolitan area, which is the center of political and economic activities, were needed to reconstruct the country's economy and assure stability. Implementation of infrastructure development, particularly alleviation of traffic congestion in Bangkok, was one of the top priority agendas. The subject project was one of three bridge projects in the Bangkok area, which was classified as high priority project under the 7th National Economic and Social Development Plan (1992-1996).

The current 10th National Economic and Social Development Plan (2007-2011) focuses on the sustainable economic development seeking establishment of well-balanced communities, or "communities filled with green and happiness". In order to achieve this target, five strategies were established. One of the strategies is regarding national economy, focusing on "development of competitive economy, creation of value-added goods while retaining Thai identity, and improvement of economic and investment infrastructures to attract foreign direct investment". In particular, the importance of infrastructure development (including development of efficient transport network in the Bangkok Metropolitan area and its vicinity) is emphasized.

According to the 2008 National Regional Plan, prepared by the Department of Public Works and Department of Town and Country Planning of the Ministry of Interior, Bangkok is proposed to be a: (1) compact city; (2) world-class city (a global city); and (3) hub for Bangkok regional economy, export and transport. Samut Prakarn District is planned under the project as an airport-related business and industry development district because of its proximity to the international airport.

The infrastructure development was a prioritized agenda in the national development plans both at appraisal and at post evaluation. The project is also in accordance with the policies and strategies stated in the 2008 National Regional Plan at the time of post evaluation.

3.1.2 Relevance with the Development Needs of Thailand

At the appraisal time (1997), there was no bridge crossing the Chao Phraya River toward downstream from the existing Rama IX Bridge. The only mode connecting both banks was a ferry. As the demand to transport industrial materials and products has been increasing along the corridor connecting the industrial area in Samut Prakarn District and Bangkok Port along Chao Phraya River, daily traffic congestion in bridges and ferries occurred due to lack of road capacity and the transport efficiency for cargo and passengers have substantially deteriorated.

Both the North-South and East-West roads, which were constructed under the project, connect between the central Bangkok area and Samut Prakarn District in the south, function as important links to form the arterial road network in the southern Bangkok, and supplement the Outer Ring Road. Thus, the need for road development under the project was/is high both at

appraisal and at post evaluation.

3.1.3 Relevance with Japan's ODA Policy

The previous Official Development Assistance (ODA, 1992) Charter stated the close relationship between Japan and the East Asian region (including ASEAN) and has put priority on Asian region. The infrastructure improvement was listed as one of its priority issues. Since the subject project was prepared before the Country Assistance Programs were introduced in 1998, a Country Assistance Program focusing on Thailand was not available.

This project has been highly relevant with the Thailand's development plan and needs, as well as Japan's ODA policy. Therefore, its relevance is considered high.

3.2 Efficiency (Rating: b)

3.2.1 Project Outputs

Both the East-West Road and North-South Road were constructed almost as planned, while the interchanges were constructed as planned.

Table 1 Comparison of Outputs (planned and actual)

Component	Planned	Actual
① Construction of Chao Phraya River Crossing Bridge	・ North-South section (North bridge 581m, South bridge 707m, a central junction, connecting roads to Rama III and Poochao Saming Roads): 6 lanes plus ramps ・ East-West section (connecting road to Suksawat Road from a central junction): 4 lanes plus ramps	as planned ・ North-South section (North bridge 576m, South bridge 702m, a central junction, connecting roads to Rama III and Poochao Saming Roads): 6 lanes plus ramps ・ East-West section (connecting road to Suksawat Road from a central junction): 4 lanes plus ramps
② Improvement of Old Railway Road (not JICA financed)	・ Bangkok Port East Gate - Poochao Saming Road with a length of about 7.5 km: improvement and widening from current 2 lanes to 4 lanes	Cancelled
③ Extension to Bangkok Outer Ring Road (not JICA financed)	・ South end of Chao Phraya River Crossing Bridge - Bangkok Outer Ring Road with a length of 1.2 km : 4 lanse plus ramps	Under construction. to be completed by June 2011.

Source: Responses to the questionnaire

Construction of Chao Phraya River crossing bridges was implemented almost as planned. However, improvement of the old railway road, of which about 2 km section is located in the Samut Prakarn District and the rest in the Metropolitan Bangkok out of a total 7.5 km section, and which was to be originally funded locally, was canceled from the project at the early stage of project implementation. The cancellation was determined necessary due to extreme difficulty

to acquire land and resettle people, and the houses and factories were densely constructed causing problems in widening the existing roads. Given the resettlement and social issues, the original plan to widen the existing road to four lanes in the densely populated area is considered to be extremely difficult. A comprehensive review and planning of the improvement project is needed, including alternative studies on construction of a new road on new alignments considering how the road development in the subject area should be implemented. Construction of the extension road to the Bangkok Outer Ring Road is being implemented by the Expressway Authority of Thailand and it is expected to be completed by June 2011.

For construction supervision of the project, five local consulting firms were employed with local funds. As discussed later, the contract period for consulting services was longer than the original plan due to extension of the project period.

Chao Phraya River Crossing Bridge
East-West section

Chao Phraya River Crossing Bridge
North-South section

3.2.2 Project Input

3.2.2.1 Project Period

The project period substantially exceeded the planned period. The planned period at appraisal was from September 1997 (Loan Agreement signing) to July 2002 (project completion), with a total period of 59 months. The actual project period was from September 1997 (Loan Agreement signing) to September 2006 (open to traffic), with a total period of 109 months, which is 185% of the planned period. The delay in project implementation is mainly due to the delay in land acquisition activities, which required about three years till commencement of selection of contractors. The loan was signed right after the Asian financial crisis, and consequently the Thai government could not allocate the budget for the land acquisition and resettlement activities in time. As a result, the land acquisition and resettlement activities could not commence as planned; and in addition, negotiation with land owners on the amount for compensation to be paid took longer.

The planned schedule for selection of contractors to the completion of civil works was from January 1998 to July 2002, with a total length of 55 months, while the actual period was from September 2000 to August 2006, with a total length of 72 months, exceeding by 20% in terms of number of months. The delay in land acquisition affected the work implementation schedule and the construction period was further extended from 520 to 590 days in three contract sections. After the work commenced, the project implementation was further delayed due to the following reasons: ①civil works under Contract No. 2 could not be implemented as planned because of the delay in relocating the power lines by the Metropolitan Electric Authority along Petchahueng Road at the central interchange area; and②design changes and variation of construction method were necessary to avoid the Islamic Cemetery in the southern section along the North-South Road.

3.2.2.2 Project Cost

The total project cost estimated at appraisal was 85.089 billion yen (of which the Japanese ODA loan amount was 14.887 billion yen and the rest was to be locally funded), while the actual total project cost was 42.418 billion yen (of which the Japanese ODA loan amount was 14.886 billion yen and the rest was to be locally funded). Comparison between planned and actual project costs was made by using the reduced costs as the base cost, 75.368 billion yen (15.867 billion baht), which was derived by excluding the cost for the cancelled old railway road component from the planned total project cost. The actual project cost was lower than planned (56% of the planned amount). In terms of local currency, the total project cost slightly exceeded the planned amount (105% of the planned amount). The main reasons for the increase in project cost are: ①delay of the total project implementation and construction work; and ② design changes, implementation of additional work, and variation orders during the construction work period. The main reasons for reduction of construction cost in Japanese yen are: ① efficient awarding results through competitive bidding, particularly for contract sections 1 and 2 (North-South Road); and ②the foreign change rate had substantially depreciated (from 1 baht = 4.75 yen to 1 baht = 2.54 yen).

Although the project cost was lower than planned, the project period was significantly longer than planned, and therefore efficiency of the project is considered moderate.

3.3 Effectiveness (Rating: a)

3.3.1 Quantitative Impacts

3.3.1.1 Results from Operation and Effect Indicators

(1) Passing traffic volume

The passing traffic volume on the subject road and bridges is shown in Table 2.

Table 2 Passing Traffic Volume

(unit: pcu/day)

	2007	2008	2009 July
Chao Phraya River Crossing Bridge: south bridge	n/a	n/a	53,000 (0.60)
Chao Phraya River Crossing Bridge: north bridge	45,500 (0.51)	51,200 (0.58)	67,500 (0.76)
East-West Road	n/a	n/a	65,000 (0.73)

Source: Based on the raw data (2009) provided by DRR, the evaluation team analyzed the data and calculated the actual traffic volume. Data on 2007 and 2008 is one provided by Bangkok Metropolitan Office.

Note 1: Figures in ( ) shows the ratio (congestion degree) against the highway capacity (88,000 vehicles/day)

Note 2: PCU = passenger car unit

Since a basic indicator to measure operational effects of a road project is traffic volume, it is therefore appropriate to compare the projected traffic volume made at appraisal and the actual current volume. However, since no bureau/division of DRR has regularly recorded the traffic count, the data provided by the Bangkok Metropolitan Office was used. In addition, based on the raw data provided by DRR, the evaluation team analyzed the data and calculated the actual traffic volume. In the feasibility study carried out in January 1996, projection of traffic volume was made assuming that all the roads (North South Road, East West Road, Old Railway Road, and Extension to the Bangkok Outer Ring Road) would be completed at the same time in 2001. Since the assumptions were substantially different, the evaluation team determined that the projected traffic volume comparison was not appropriate, and instead checked the level of achievement of the project objectives by comparing the actual traffic volume to the highway capacity (level of congestion). The congestion level of East West Road and North South Road (north bridge section) in three years after the project completion has reached 0.73 and 0.76, respectively, and considered traffic volume high. The traffic volume in the south bridge section was slightly lower. However, upon completion of the extension to the Outer Ring Road in June 2011, the traffic volume is expected to increase rapidly.

(2) Reduction of travel time

Since no data on travel time between two specific locations before the project is available, the current required time to travel between two selected locations was surveyed on two different routes and results were compared under this post evaluation. Two selected locations were around the gate for Bangkok Port as the beginning point in the north, and about 1.3 km east from the North South Road along Phuchao Saming Road as the ending point in the south.

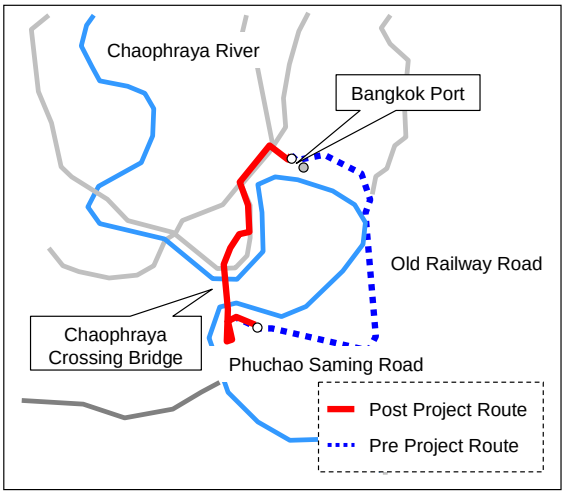

Figure 2 Specific Two Locations on both sides of Chao Phraya River

Table 3 Required Time to Travel the Specific Segment along the North South Road Corridor before and after the Project

	Segment (Route)	Length (km)	Require time (minutes)
Before the Project	Old Railway Road, Poochao Saming Road	17.3	90
After the Project	Rama III Road, North-South Road (project road), Poochao Saming Road	11.7	21

Source: Actually measured time by the evaluation team during 8:00 AM − 10:00 AM on May 14, 2010

Note: Required time was measured by 2 teams by traveling the route clockwise and counterclockwise.

The required time to travel between two specific locations after the project completion has been reduced by about one hour ten minutes compared to that before the project. Reduction of travel time could be due to shorter travel distance and reduction of traffic congestion level. However, the results should be for reference only since the current road/transport and social-economic conditions are quite different from those in 1997, when the project was prepared. Meanwhile, the result of the beneficiary survey showed that the travel time of road users was reduced by 30 minutes in average after the project was completed.

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

Economic Internal Rate of Return (EIRR)

The Economic Internal Rate of Return (EIRR)at appraisal was estimated at 18.9%, assuming that construction costs, consulting services fees and maintenance costs required for the project (only Chao Phraya River Crossing Bridge) are considered as “cost”; and savings of vehicle operating costs and travel time saving costs are considered as “benefit”; and that the project life is twenty four years. The EIRR at post evaluation was estimated at 28.4%. In order to make this calculation, the following assumptions were made. Costs are actual construction costs, actual consulting services fees, and maintenance costs increased by the project (based on the projected costs made by DRR, costs required for the 24-year project life period, used at appraisal were re-estimated). Quantitative benefits are savings of vehicle operating costs and travel time savings (based on the projected benefits made by DRR, benefits to accrue for the 24-year project life period, used at appraisal were re-estimated). The reasons for higher EIRR than the original estimate were because the project cost was lower than planned, the actual traffic volume was higher than projected, and the traffic volume during the remaining period of the project life was much higher than projected due to a 4-year delay in project completion against the original schedule.

Table 4 Economic Internal Rate of Return (EIRR)

	EIRR
At appraisal	18.9%
At post evaluation	28.4%

Source: Responses to the questionnaire

3.3.2 Qualitative Effects

Beneficiary surveys, through interviews, were conducted in the project area. The number of respondents was 159 persons. Responses were collected from road users (80 drivers and passengers), and/or local residents/workers (79 persons), and/or all respondents depending on the contents of questions. The classification of respondents by sex was 35% female and 65% male.

Eighty-five (85) percent of respondents perceive that the traffic congestion in the project area has improved and 95% of road users responded that the travel/commuting time has been substantially reduced. Eighty (80) percent of drivers/road users perceive that the transport cost was reduced particularly due to reduction in fuel costs (73%), and consider ferriage (23%) as the main factor for lower transport costs. It was concluded that the project has greatly contributed to the enhancement of transport efficiency and alleviation of traffic congestion.

Upon completion of the project, Samut Prakarn District was directly connected with the central Bangkok area, and the project contributed to the enhancement of Bangkok road network.

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

3.4 Impact

3.4.1 Intended Impacts

Population of Metropolitan Bangkok as of 2008 is about 5.71 million and that of Samut Prakarn district, which is the subject project area, is about 1.15 million.

Fifty-four (54) percent among all the respondents (159 persons) perceive that the project contributed to the regional economy, and 35% no impact. The people who perceive no impact considers the current economic depression/unstable political situation at the national level as more dominant.

Sixty-six (66) percent of local residents/workers (79 persons) perceive that there was no major change in the household income before and after the project. However, 18% say that the income has increased. Positive answers were provided mainly by business executives and owners. The reason for the positive answer could be that accessibility to the central Bangkok area has improved and their businesses have been promoted. These results indicate that the impact and contribution of the project to the economic development (i.e., increasing the household income) in southern Bangkok area is limited.

Sixty-three (63) percent of local residents/workers perceive that the land in the region has been more effectively used and none of respondents perceive any negative impact. Regarding the land price, 44% of respondents perceive that it has increased upon completion of the project. In order to clarify the facts, the land price (government declared value) of the project area before/after the project was investigated. Results are shown in Table 5.

Table 5 Change of Land Price in the Project Area

(unit: baht/4m^2)[2]

Subject area	Government declared price for 2004-2007 (before project)	Government declared price for 2008-2011 (after project)
Along Phuchao Samingprai Road in Samut Prakarn District at south end of North-South Road	30,000 – 40,000 (35,000)	30,000 - 40,000 (35,000)

Source: Treasury Department, Ministry of Finance

[2] Thai specific unit indicating the government declared land price.

Comparison of land prices (government-declared price) of the project area before/after the project indicate that there is no change in land price. The reason for no change in land price could be that the Samut Prakarn district is already a dense and developed commercial district.

Sixty (60) percent of all the respondents recognize that the project contributed to the promotion of tourism. People perceive that since Chao Phraya River Crossing Bridge (cable stayed) is aesthetically attractive, hence it is already a best tourist spot (particularly for photographing) for international and domestic tourists.

3.4.2 Other Impacts

(1) Impacts on the natural environment

Countermeasures for traffic noise were implemented in the embankment and low viaduct sections almost as planned and thus, no environmental issues have emerged. Among all the respondents to the beneficiary surveys, 16% of respondents perceive that the urban environment has improved, but 52% say that there has been no change. Twenty-three (23) % recognize that the environment has worsened. Thus, their responses/opinions are split. It seems that the negative responses came mainly from people who live around the high viaduct sections, where the countermeasures for noise protection were difficult.

(2) Land acquisition and resettlement

At the beginning of the project, the Thai government could not timely allocate the budget for land acquisition required for bridge construction and resettlement activities, and negotiations on the compensation amount with some land owners took longer time. However, the process and procedures for land acquisition were implemented properly. The estimated land area to be acquired at appraisal was 581,000 ㎡, while the actual land area acquired was about 576,000 ㎡, which is almost as planned. Resettlement of 599 households was planned at appraisal based on preliminary designs. However, based on detailed designs, 472 households were actually resettled, which is slightly lower than planned. The total cost spent for land acquisition and resettlement was 6,356 million baht (5,027 million baht for land acquisition and 1,329 million baht for compensation), which was about 97% of the planned.

(3) Other impacts

Regarding effective land use, the beneficiary survey confirmed that with the construction of parks, a field track, and a museum under the project, the project contributed to improvement of the living and cultural environment for local residents.

3.5 Sustainability (Rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

The Rehabilitation and Maintenance Division (staffed with 649 persons) of Public Works Department of the Ministry of Interior (PWD) was to be responsible for maintenance upon completion of the project. However, in October 2002 the central government was reorganized and the responsibility for this project was transferred to the Department of Rural Roads (DRR) of the Ministry of Transport. DRR consists of 11 Bureaus and the Regional Bureau (with 18 District Offices). The number of regular and non-regular staff as of 2008 is about 5,700. In principle, the Bureau of Maintenance is responsible for maintenance work after a project was completed and the number of staff assigned to the Bureau is about 200. Maintenance Bureau has 10 maintenance offices throughout the nation. Since the constructed bridge is a high technical cable-stayed bridge that requires special technology for maintenance, it was considered appropriate that the unit staffed with specialists in the subject sector will be in charge; exceptionally a field office of the Bridge Construction Bureau (staffed with 100 specialists and workers), which was responsible for construction is responsible for operation and maintenance of the bridge section as well. Since there is no cable-stayed bridge under the responsibility of DRR, the technical assistance is sought as needed by the Bangkok Metropolitan Authority (operating Rama 8 bridge) and Expressway Authority of Thailand (operating Rama 9 bridge), which have been operating and maintaining cable-stayed bridges. The field office is staffed with engineers (two civil engineers, one electrical engineer, and one mechanical engineer), technicians (two civil, one electrical and one mechanical staff), and 60 workers. It is considered that the organizational setup for maintenance of the completed project is appropriate.

North-South Road – connecting point with Rama III Road (north end)

Traffic control monitoring room (Field office)

3.5.2 Technical Aspects of Operation and Maintenance

The number of professional staff of DRR is about 1,700. The Bureau of Training and Participation is responsible for staff training, and training is carried out by senior engineers of each Bureau and Division and in-house consultants. Training subjects are prepared for each stage of project implementation, including design, construction, and maintenance/operation. Training for maintenance and operation focuses on process and procedures for maintenance of ordinary rural roads.

There were no comprehensive technical standards guidelines and manuals documented on maintenance techniques and procedures in detail have been prepared. Maintenance of pavement was undertaken referring to various manuals of American Association of State Highway and Transportation Official. The technical level of the executing agency in charge of operation and maintenance was considered appropriate.

3.5.3 Financial Aspects of Operation and Maintenance

The annual budget of DRR for the past four years is shown in Table 6.

Table 6 Budget of DRR by Year

(unit: million baht)

Item	2006	2007	2008	2009
New construction/ improvement	13,694	9,624	8,705	13,088
Operation/maintenance	5,180 (24%)	5,752 (32%)	6,436 (37%)	6,853 (31%)
Others (including capacity building)	2,569	2,482	2,163	2,429
Total	21,442	17,859	17,304	22,370

Source: Draft SAPROF Final Report for the Chao Phraya River Crossing Bridge at Nonthaburi 1 Road Construction Project, November 2009

Note 1: Fiscal year starts in October and ends in September (FY2009: October 2008 – September 2009)

Note 2: Numbers in ( ) are share of operation/maintenance budget among the total DRR budget

The share of budget for operation and maintenance against the DRR total budget for the past three years is more than 30%, which was considered appropriate. However, according to the persons in charge, the budget for maintenance is not sufficient to procure heavy equipment. The Maintenance Bureau currently has only 5 types of equipment with six units in total, which is considered insufficient. Since the roads constructed under the project are essential links in the Metropolitan Bangkok road network, priority is given to these roads in terms of budget allocation within the limited budget resources. Budget is allocated as needed; there is no criteria for budgeting, such as cost per kilometer or by type of pavement.

3.5.4 Current Status of Operation and Maintenance

Regular maintenance work (daily inspection, routine maintenance, periodic maintenance (minor repair) and major rehabilitation) have been carried out according to the simple maintenance and management work manuals of DRR. Daily inspection is carried out during the day and night on weekdays and only during the day on weekends. Condition of the pavement surface and traffic management facilities is visually inspected and monitored. Daily routine maintenance includes minor repairs such as patching pot holes, cleaning pavement surfaces, and inspection/cleaning of lighting facilities, as needed. Periodic maintenance includes repainting of markings (in principle every other year), overlay every four years, and change of expansion joints of bridges every five years. However, due to budget constraints, maintenance work has been implemented based on priority schedule from daily inspection results and the amount of traffic volume. Major rehabilitation is implemented depending on the degree of deterioration of road and bridge structures. Major repair works, more than periodic maintenance have been entrusted to two private companies on the annual contract basis since 1997.

Up to now since project completion, no major repairs have been implemented, except for repairs on some approach ramps and pavement resurfacing, and the road surface has been well maintained. No cracks, pot holes and damaged joints were found on the surface of bridge and viaducts sections, and thus it is considered that maintenance has been properly undertaken.

However, as traffic volume increases, it is essential to check the bridge deck from the back whether or not it has been damaged. This kind of inspection should be also carried out on other existing bridges. Thus, procurement of a bridge inspection vehicle needs to be considered.

No major problems have been observed in the operation and maintenance system, therefore sustainability of this project is considered high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project has been highly relevant with the development policies and needs of Bangkok, Thailand, as well as Japanese aid policies. The project cost was within the planned cost, but the project period substantially exceeded the plan. Therefore, the evaluation for efficiency is considered moderate. The project has largely achieved its objectives, and its effectiveness is highly satisfactory. No major problem has been observed in the capacity of the executing agency nor its operation and maintenance system. Therefore, sustainability of this project is considered high.

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

4.2 Recommendation

4.2.1 Recommendations to the Executing Agency

As previously recommended (under the post evaluation (2006) for the related ODA project, Wat Nakorn-In Bridge and Connecting Road Construction Project (1)(2)), it is essential to start conducting regular traffic count as soon as possible at the same location and same time of the year. Data on traffic volume is essential in planning and programming the maintenance and management work and for preparation of future road development plans. Maintenance Bureau of DRR could be an appropriate unit responsible for collecting data on traffic count, and analyzing and storing the data.

4.3 Lessons Learned

One of the project components, improvement of the old railway road was cancelled during project implementation. Because this component was not to be financed by the ODA loan, review on the safeguard issues (environment, and land acquisition/resettlement) and the implementation plan was excluded from the project appraisal. In addition, the environmental guidelines at appraisal time (1997) did not clearly state how the guidelines should be applied to this project component. Regardless of whether or not a project component would be financed by the ODA loan, it should be reviewed and appraised at the same level of detail applied to the main project component, when appraising a future proposed project.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
① Outputs		as planned
1) Construction of Chao Phraya River Crossing Bridge	・ North-South section (North bridge 581m, South bridge 707m, a central junction, connecting roads to Rama III and Poochao Saming Roads): 6 lanes plus ramps ・ East-West section (connecting road to Suksawat Road from a central junction): 4 lanes plus ramps	・ North-South section (North bridge 576m, South bridge 702m, a central junction, connecting roads to Rama III and Poochao Saming Roads): 6 lanes plus ramps ・ East-West section (connecting road to Suksawat Road from a central junction): 4 lanes plus ramps
2) Improvement of Old Railway Road (not JICA financed)	・ Bangkok Port East Gate - Poochao Saming Road with a length of about 7.5 km: improvement and widening from current 2 lanes to 4 lanes	cancelled
3) Extension to Bangkok Outer Ring Road (not JICA financed)	・ South end of Chao Phraya River Crossing Bridge - Bangkok Outer Ring Road with a length of 1.2 km : 4 lanse plus ramps	under construction. to be completed by June 2011.
② Project Period	September 1997 – July 2002 (59 months)	September 1997 – September 2006(109 months)
③ Project Cost		
Amount paid in foreign currency	24,560 million yen	14,886 million yen
Amount paid in local currency	60,619 million yen (12,762 million baht)	27,532 million yen (10,839 million baht)
Total	85,089 million yen	42,418 million yen
Japanese ODA loan portion	14,887 million yen	14,886 million yen
Exchange rate	1 baht＝4.75 yen (as of January 1997)	1 baht＝2.54 yen (September 29, 2000, fixed during the contract period at the rate as of the date, 28 days before submission of bids.)

Second Opinion Report on
Industrial Ring Road Construction Project, Thailand

Associate Professor Chuvej Chansa-ngavej, PhD
School of Management
Shinawatra University (SIU International)
Thailand

The interpretation of data in the ex-post evaluation report appears to have been done with professional care. Both objective data and subjective questionnaire survey results are used to complement each other. The survey questionnaire has been well-designed to cover all important aspects. However, in the report it was found that a large number of respondents (35%) perceived no impact of the project on local economy because the "unstable political situation at the national level is more dominant". An explanation for such perception could be because the questionnaire survey was most likely conducted around the time of political unrest in Bangkok during the second quarter of 2010. In normal situation, the perception of the project impact would have been much more positive.

The relevance of the project with the development needs of Thailand cannot be overstated. Although it is not in one of the fastest growing areas in Bangkok metropolitan area in terms of housing and commercial development, the project is of strategic importance in linking the industrial area with the Bangkok port and the outer ring road. The aesthetic design of the bridges is also invaluable for enhancement of the public perception of the area. However, a lesson learned is that future design of roads should avoid such sensitive areas as cemeteries in the first place, otherwise costly design changes or re-alignment of roads would be needed upon its implementation.