Ex-Post Project Evaluation 2017: Package Ⅰ-2 (Viet Nam)

September 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

Mitsubishi UFJ Research & Consulting Co., Ltd.

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Socialist Republic of Viet Nam

FY2017 Ex-Post Evaluation of Japanese ODA Loan Project

"Red River Bridge Construction Project (I) (II) (III) (IV)"

"Hanoi City Ring Road No.3 Construction Project"

External Evaluator: Masumi Shimamura,
Mitsubishi UFJ Research and Consulting Co., Ltd.

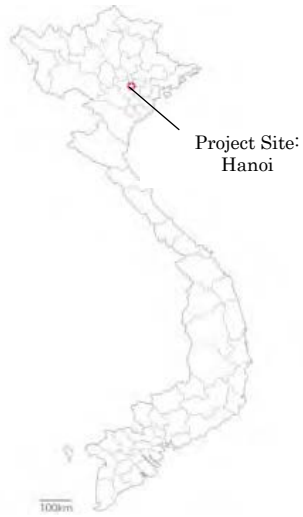
0. Summary

Both projects aimed to respond to the increasing traffic demands in Hanoi City and the surrounding areas through the construction of Red River Bridge, New Phu Dong Bridge and Phap Van Viaduct of the Hanoi City Ring Road No. 3 by "Red River Bridge Construction Project (I) (II) (III) (IV)", and through the construction of a road in the section between its intersection with National Highway No. 32 and the North of Linh Dam Lake by "Hanoi City Ring Road No.3 Construction Project". Both projects aimed at eliminating the bottleneck of road traffic in Hanoi City and improving logistics efficiency are consistent with the country's development policy, development needs as well as with Japan's ODA policy that set out support for economic infrastructure development. Therefore, the relevance of the projects is high. With regards to efficiency, it is judged to be fair when both projects are summed as one project. Regarding project effectiveness, when taking into account the analysis results on quantitative effects of both projects (for Red River Bridge Construction Project, the actual traffic volume was a little lower than 80% of the target value at one point, however, when considering that it is the traffic volume after the traffic was dispersed to other new bridges which were developed after the appraisal of the project, it can be regarded that the target has been sufficiently achieved. The actual result of time saving greatly exceeded the target values for all of the three measurement points. For Hanoi City Ring Road No.3 Construction Project, the actual traffic volume is slightly less than 80% of the target value, however, it is judged that it has achieved sufficiently when taking into consideration the results of hearings to beneficiaries. The actual result of time saving greatly exceeded the target value set at the time of appraisal) as well as results of interviews with beneficiaries, it can be considered that both projects are contributing to alleviating traffic congestion in Hanoi City and improving logistics in the northern part of Vietnam. In addition, impact that both projects contribute to the development of the regional economy by securing smooth road transport is also seen; thus, effectiveness and impact are high. No particular big problem has been reported on the impact on natural environment, and resettlement and land acquisition process has been properly implemented based on the relevant regulations in Vietnam and thus there is no problem. Regarding operation and maintenance, some minor problems have been observed in terms of the institutional aspect and financial aspect. Therefore, sustainability of the

effects generated by both projects is fair.

In light of the above, both projects are evaluated to be satisfactory.

1. Project Description



Project Location

Red River Bridge

1.1. Background

The roads of Hanoi City, the capital of Vietnam, have been pointed out so far problems such as lack of a road network, insufficient road width, and poor pavement, etc. Despite recognizing the importance of strengthening the function as the biggest city in northern Vietnam, the road network in Hanoi could not respond to the rapid increase of road traffic with rapid urbanization and motorization accompanying economic growth, in addition to the population increase. As a result, there were problems such as traffic jam, deterioration of traffic safety, air pollution, etc. At the time of project formulation, there were only three bridges in Red River which split Hanoi in two – Thang Long Bridge, Chuong Duong Bridge and Long Bien Bridge. Part of Long Bien Bridge was destroyed by the north bomb, and was supported by the temporary piers, and corrosion of the parts was progressing, so operation as it was dangerous. It was predicted that the other two bridges would face traffic volume far beyond their capacity in the future. In addition, traffic congestion in the city was getting worse due to increase in traffic volume flowing from the southern area and Hai Phong City to Hanoi City through National Highway No. 1 and National Highway No. 5. Furthermore, there were seven radiation trunk roads spreading around Hanoi City, however, since there was no outer ring road, traffic was concentrated in the center of the city including transit traffic and thus the traffic situation in the city was exacerbating. Through both projects, it was urgently needed to improve logistics efficiency by constructing a new

bridge to Red River and ring road to spread increasing traffic volume in Hanoi City and surrounding areas to both projects, and to alleviate traffic congestion in the City and surrounding areas.

1.2 Project Outline

The objective of the projects is to respond to increasing traffic demand in Hanoi City and surrounding areas, by constructing Red River Bridge, New Phu Dong Bridge and Phap Van Viaduct of Hanoi City Ring Road No.3 by "Red River Bridge Construction Project (I) (II) (III) (IV)", and by constructing a road in the section between its intersection with National Highway No. 32 and the North of Linh Dam Lake by "Hanoi City Ring Road No.3 Construction Project" of Hanoi City Ring Road No.3, which is an urgent issue for the improvement of road transport network of Hanoi City, thereby contributing to the economic development of the area.

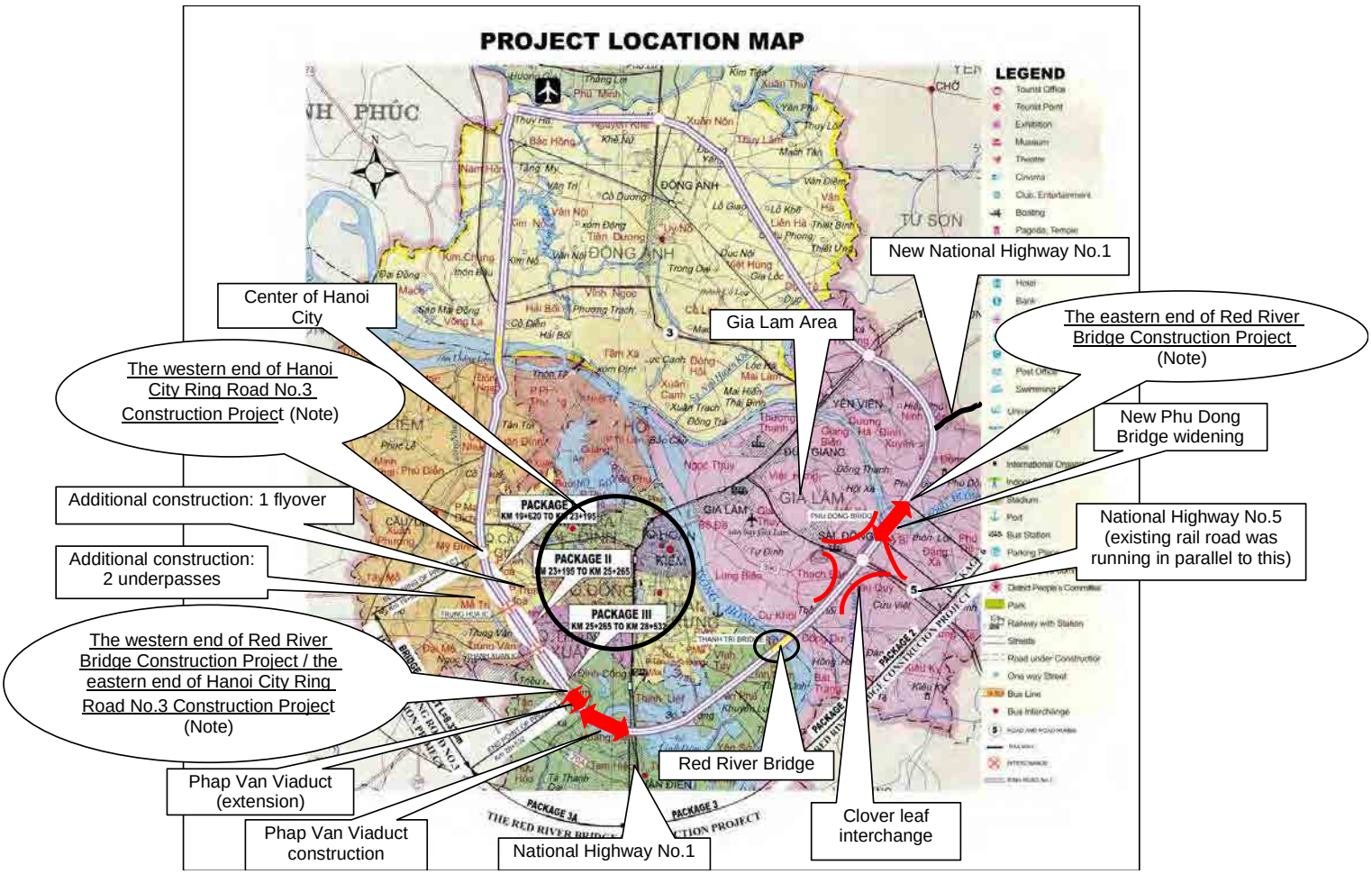


Figure 1: Project Location Map

Source: Prepared by the evaluator based on the information provided by executing agency

Note) The eastern end and the western end of the target section of each project are indicated by elliptical balloons.

Loan Approved Amounts/ Disbursed Amounts	・Red River Bridge Construction Project 10,000 million yen / 9,950 million yen (Phase I) 14,863 million yen / 13,775 million yen (Phase II) 2,415 million yen / 2,254 million yen (Phase III) 13,711 million yen / 13,172 million yen (Phase IV) ・Hanoi City Ring Road No.3 Construction Project 28,069 million yen / 22,741 million yen
Exchange of Notes Dates/ Loan Agreement Signing Dates	・Red River Bridge Construction Project March, 2000 / March, 2000 (Phase I) March, 2002 / March, 2002 (Phase II) March, 2004 / March, 2004 (Phase III) March, 2006 / March, 2006 (Phase IV) ・Hanoi City Ring Road No.3 Construction Project March, 2008 / March, 2008
Terms and Conditions	・Red River Bridge Construction Project Interest Rate: 1.8% (Phase I) 0.75% (Phase I consultant) 1.8% (Phase II) 1.3% (Phase III) 1.3% (Phase IV) Repayment Period: 30 years (40 years for Phase I consultant) (Grace Period: 10 years) Conditions for Procurement: General Untied (Bilateral Tied for Phase I consultant) ・Hanoi City Ring Road No.3 Construction Project Interest Rate: 1.2% 0.01% (consultant) Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied
Borrower / Executing Agencies	・Red River Bridge Construction Project (I) (II) (III) (IV) The Government of the Socialist Republic of Vietnam / Ministry of Transport

	・Hanoi City Ring Road No.3 Construction Project The Government of the Socialist Republic of Vietnam / Directorate for Roads of Vietnam
Project Completion	・Red River Bridge Construction Project (I) (II) (III) (IV) May 2018[1] ・Hanoi City Ring Road No.3 Construction Project July, 2016[2]
Main Contractors (Over 1 billion yen)	・Red River Bridge Construction Project Package I: Obayashi Corporation (Japan) / Sumitomo Construction Co., Ltd. (Japan) (JV), Package II: Obayashi Corporation (Japan), Package III: Sumitomo Mitsui Construction Co., Ltd. (Japan) / Thang Long Construction Corporation (Vietnam) / Civil Engineering Construction Corporation No.8 (Vietnam) (JV), Package III A: Sumitomo Mitsui Construction Co., Ltd. (Japan) / Thang Long Construction Corporation (Vietnam) (JV), Package VI: Thang Long Construction Corporation (Vietnam) / Civil Engineering Construction Corporation No.4 (Vietnam) / Civil Engineering Construction Corporation No. 1 (CIENCO 1) (Vietnam) (JV), Package NH5: Thang Long Construction JSC (TLG) (Vietnam) / Civil Engineering Construction Corporation No.4 (Vietnam) (JV) ・Hanoi City Ring Road No.3 Construction Project Package 1: Samwhan Corporation (Korea) / Civil Engineering Construction Corporation No.4 JSC (Vietnam) (JV), Package 2: Sumitomo Mitsui Construction Co., Ltd. (Japan), Package 3: Civil Engineering Construction Corporation No.4 JSC (Vietnam) / Thang Long Joint Stock Corporation (Vietnam) / Civil Engineering Construction JSC 8 (Vietnam) (JV), Package NH6: Hanshin Engineering & Construction Co., Ltd. (Korea) / Civil Engineering Construction Corporation No.4 (Vietnam) (JV), Package Trung Hoa IC: Hanshin Engineering & Construction Co., Ltd. (Korea) / Civil Engineering Construction Corporation No.4 (Vietnam) (JV)

[1] At the end of warranty period after completion of construction of the additional scope of phase IV.
[2] At the time of construction completion including the additional scope.

Main Consultants (Over 100 million yen)	・Red River Bridge Construction Project (I) (II) (III) (IV) Oriental Consultants Global Co., Ltd. (Japan) ・Hanoi City Ring Road No.3 Construction Project Oriental Consultants Global Co., Ltd. (Japan) / Katahira & Engineers International (Japan) (JV)
Related Studies (Feasibility Studies, etc.)	・Red River Bridge Construction Project (I) (II) (III) (IV) - JICA Master Plan of Urban Transport for Hanoi City in Viet Nam (January, 1997) - JICA Development Study on The Feasibility Study on the Thanh Tri Bridge and The Southern Section of Ring Road No.3 in Hanoi in Socialist Republic of Viet Nam (September, 1998) ・Hanoi City Ring Road No.3 Construction Project - JBIC SAPROF on Hanoi City Ring Road No.3 Construction Project (July, 2007)
Related Projects	・Technical Cooperation - Development Study, The Feasibility Study on the Thanh Tri Bridge and The Southern Section of Ring Road No.3 in Hanoi in Socialist Republic of Viet Nam (1997-1998) - Development Study, The Detailed Design of the Red River Bridge (Thanh Tri Bridge) Construction Project in the Socialist Republic of Viet Nam (1999-2000) - Development Study, The Study on the National Transport Development Strategy in Vietnam (1999-2000) - Development Study, Comprehensive Study on the Sustainable Development of Transport System in Vietnam (2007-2010) ・Japanese ODA Loan - National Highway No.5 Improvement Project (1) (2) (3) (January, 1994, April, 1995, March, 1996) ・Asian Development Bank National Highway No.1 Rehabilitation Project (2002) ・Asian Development Bank - National Highway No.1 Rehabilitation Project (2002)

2. Outline of the Evaluation Study

2.1 External Evaluator

Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

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

Duration of the Study: August, 2017 – September, 2018

Duration of the Field Study: October 29 – November 25, 2017, December 3 – December 23, 2017, March 18 – April 16, 2018

2.3 Evaluation Approach

Both Red River Bridge Construction Project (I) (II) (III) (IV) and Hanoi City Ring Road No.3 Construction Project are located on Ring Road No. 3, therefore, ex-post evaluation was conducted for both projects as one in this evaluation study. As an evaluation approach, basically, analysis and judgment was made on each project, and based on these results comprehensive judgment was made, taking both projects as one.

In addition, since Red River Bridge Construction Project (I) (II) (III) (IV) is a time sliced project[3] for which loan was provided in four phases, in the analysis of efficiency, project scope (outputs) was analyzed and evaluation judgment was made as a whole, taking the whole as one project. (As regards outputs, comparison was made between phase I plan and the actual. As regards project period, comparison was made between phase I plan and the actual since the timing of each phase was different. As regards project cost, comparison was made between phase IV plan at the time of final scope change and the actual.)

3. Results of the Evaluation (Overall Rating: B[4])

3.1 Relevance (Rating: ③[5])

3.1.1 Consistency with the Development Plan of Vietnam

In the *Socio-Economic Development 10-year Strategy* (hereinafter referred to as "SEDS") (2001-2010) at the time of appraisal, the Vietnamese Government established the road development policies, emphasized on road development at industrial development districts in each region, maintenance of major bridges, renovation and new construction of roads considering access to the Greater Mekong Sub-region (GMS) countries. Also, in the *Eighth Social Economic Development Five-Year Plan* (hereinafter referred to as "SEDP") (2006-2010) and *Road Development Master Plan to 2010 and*

[3] For large-scale projects, projects are divided into phases by period and are implemented in accordance with their progress.

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

[5] ③:High, ②:Fair, ①:Low

Orientation Up to 2020, the importance of main road development in urban areas such as Hanoi and Ho Chi Minh was pointed out. Furthermore, the *National Vehicle Transport Development Master Plan (～2010)* which was formulated through the *National Transport Strategy Study for the Socialist Republic of Vietnam (VITRANSS)* (created by JICA in 2000, target year 2020) pointed out the construction of an effective transportation network by 2010 as well as development of public transportation networks in urban areas such as Hanoi and Ho Chi Minh.

At the time of ex-post evaluation, the Vietnam Government focused on the construction and investment of urban infrastructure, especially in Hanoi City in the SEDP (2011-2020). In SEDP (2011-2015), the government indicates that one of the important aspects of socioeconomic infrastructure development in metropolitan areas is the establishment of an urban transportation network that uses advanced and environmentally friendly technologies. Thus, the infrastructure investment for easing traffic congestion in Hanoi City particularly is considered as the most important development priority. In addition, the importance of the Ring Road No.3 continues to be recognized as the center of traffic access to and from Hanoi City in the *Hanoi Transportation System Master Plan (-2030)* formulated in March 2016 by Hanoi People's Committee. In order to respond to the further increase in traffic demand in the future, it is indicated that improvement of the Ring Road No.3 and construction of Ring Road No.4 and No.5 in the outline are necessary. Even at the time of ex-post evaluation, it is considered as important to implement of urban road infrastructure improvement.

3.1.2 Consistency with the Development Needs of Vietnam

Upon appraisal, urban traffic was not improved in response to the population increase in the capital city of Hanoi and fierce road traffic demand due to the rapid urbanization accompanied by high economic growth and motorization, and thus there was an urgent need to improve road traffic in Hanoi City and surrounding areas. Both projects aim to respond to increasing traffic demand in Hanoi City and surrounding areas by constructing a new bridge and ring road, thereby contributing to securing efficient logistical transportation and meeting the development needs of Vietnam.

At the time of ex-post evaluation, although there is improvement in transportation infrastructure especially in trunk transportation network in Vietnam, traffic volume has been greatly exceeding capacity in both physical distribution and human flow with high economic growth rate exceeding 7% per year on average, so investment in transportation infrastructure development is an urgent issue. As shown in Table 1, the volume of passenger traffic and freight traffic in Hanoi City and Red River Delta are increasing every year, especially after the merge of the former Ha Tay Province, located

adjacent to the west of Hanoi's old area, into the Hanoi City in August 2008, which has become one of the causes of further increase of population and traffic volume in Hanoi City.

Table 1: Trend in Passenger and Freight Traffic by Road in Hanoi and Red River Delta

	2008	2009	2010	2011	2012	2013	2014	2015
Hanoi								
Passengers (mil. persons)	495.8	547.8	646.6	651.0	719.3	776.8	855.9	917.5
Freight (thous. tons)	55,203	58,491	71,450	75,109	82,522	75,920	84,006	90,306
Red River Delta								
Passengers (mil. persons)	579.5	638.4	748.6	767.9	842.5	906.7	997.6	1,071.0
Freight (thous. tons)	148,108	163,433	191,371	215,947	238,811	245,226	265,067	288,159

Source: General Statistics Office of Vietnam

Under these circumstances, the importance of the Hanoi City Ring Road No.3 continues to be pointed out for the improvement of logistics through easing traffic congestion in Hanoi City and improving efficiency of road network. For this reason, the importance of both projects remains unchanged at the time of ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

The *Country Assistance Program for Vietnam* and *Country-Specific Business Implementation Policy* indicated to provide assistance especially focusing on "international and domestic trunk line transportation (northern and southern economic growth priority areas, north-south trunk line), urban transportation (Hanoi City, Ho Chi Minh City). In addition, the *Overseas Economic Cooperation Operations (FY2005)* regarded "infrastructure development for sustainable growth" as a priority area and stated the improvement of economic infrastructure such as transportation etc. as the foundation of economic and social activities. Both projects aim to eliminate traffic congestion in the city and improve commodity distribution in the northern part of Vietnam by constructing bridges and ring road in Hanoi City, thereby contributing to economic growth in the region and being consistent with the Japanese government's support policy at the time.

From the above, this project has been highly relevant to the country's development plan

and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

3.2.1.1 Red River Bridge Construction Project (I) (II) (III) (IV)

As regards outputs, comparison was made between phase I plan and the actual as described above. Table 2 summarizes the comparison of planned and actual outputs.

Table 2: Comparison of Planned and Actual Outputs

Phase I Plan	Actual	Change Time・Contents
Civil Works		
(a) Bridge Construction		
① Red River Bridge (new construction) Bridge Length: 3.1km Number of Lanes: out-bound/in-bound 6 lanes	As planned	―
―	② -1 Phap Van Viaduct construction (new construction)	Added at the time of phase III appraisal
―	② -2 Phap Van Viaduct construction (new construction) partial extension	Added at the time of phase III implementation
―	③New Phu Dong Bridge widening	Added at the time of phase III appraisal
(b) Approach Road (New Construction)		
①Thanh Tri Section (section between National Highway No.1 and Red River Bridge) Bridge Length: 6.6km, Number of Lanes: out-bound/in-bound 4 lanes, Number of Interchanges: 3, Toll plaza: 1 ② Gia Lam Section (section	①Thanh Tri Section: toll plaza in 1 place was cancelled, other than that, as planned ② Gia Lam Section: as planned ・7 bridges were changed to	Modified during phase III implementation

between National Highway No.5 and Red River Bridge) Bridge Length: 3.6km, Number of Lanes: round-trip 4 lanes, Number of Interchanges: 2 Total number of bridges for ① Thanh Tri Section and ②Gia Lam Section: 7	"4 bridges, 2 flyovers and 1 viaduct"	
(c) Social Infrastructure Development for Resettlement Areas		
Infrastructure development in resettlement areas (6 places) (road, drainage, distribution line, water supply etc.)	Infrastructure development in resettlement areas (10 places) (road, drainage, distribution line, water supply etc.)	Number of resettlement sites increased at the time of phase II appraisal
(d) Others		
—	Construction of ramps (4 places) (= clover leaf interchange), realignment of rail road (section of 2km) and widening of existing National Highway No. 5 (section of 0.5km) in Gia Lam Section	Added during Phase IV implementation
Consulting Services		
・Assistance in tendering and construction supervision etc. ・Provision of training to maintenance engineers, preparation of maintenance manual, assistance in environmental measures	As planned	—

Source: Results from questionnaire survey of executing agency

Major changes and reasons for change in outputs of civil works are as follows.

(a) Regarding bridge construction, Red River Bridge was constructed as planned. Construction of Phap Van Viaduct (new construction) and widening of New Phu Dong Bridge were added at the time of phase III appraisal. In addition, partial

extension of Phap Van Viaduct was added during phase III implementation. Construction section of Phap Van Viaduct including the partial extension is a heavy traffic section, located in the western end of the project and is connecting to Phap Van – Cau Gie Inter Change leading to National Highway No. 1 and to Phap Van – Cau Gie Road. In order for Rind Road No. 3 to fully demonstrate its function as a ring road, it was necessary to newly construct and extend Phap Van Viaduct. In addition, the widened section of New Phu Dong Bridge is located in the eastern end of the project and is necessary to go through this section in order to pass New National Highway No. 1 north and south, after the construction of Red River Bridge. After the development of Red River Bridge, traffic increase was anticipated in this section, and industrial zones (such as Sai Dong Industrial Zone) were developed in the surrounding areas. Thus, it was necessary to widen the bridge so as to respond to increasing traffic and to exercise full function as a ring road. The executing agency recognized the importance and urgency of their development at the time of phase I planning of the project and had planned to develop the scope with their own funds. However, since project cost was saved due to the effect of exchange rate fluctuation during the project period (depreciation of Vietnamese Dong against yen), the executing agency added them to this project scope[6]. The additional scope is deemed appropriate, commensurate with inputs, in light of its high importance and urgency.

(b) Regarding approach road (new construction), deletion or change of scope was decided during phase III implementation. Toll plaza was cancelled because new regulation regarding setting intervals of toll plazas were introduced and enforced, and installation of the toll plaza, which had been originally planned was no longer necessary. Construction of seven bridges was changed to four bridges, two flyovers and one viaduct because land use plan around the planned construction site of bridge was changed. Scope change is deemed appropriate, commensurate with inputs, in order to respond to the enforcement of new provisions regarding the establishment of toll plazas as well as change of land use plan.

(c) Regarding social infrastructure development for resettlement areas, the number of resettlement sites increased from six to ten during phase II appraisal. This was because a survey on the number of resettled households was conducted during phase I implementation and it became clear that there were more target households than initially anticipated. The increase in the number of resettlement sites is deemed appropriate, based on the actual number of target households.

(d) In addition, construction of ramps (four places), realignment of rail road, and

[6] The executing agency explained that it was going to utilize its own fund to develop them even if they were not added to the project scope, given their high importance and urgency.

widening of existing National Highway No. 5 in Gia Lam Section were added during phase IV implementation. Gia Lam Section is located at the connection point of Ring Road No. 3 and National Highway No. 5, and exit/entrance points from Ring Road 3 to National Highway No. 5/National Highway No. 5 to Ring Road 3 have been encountering chronic traffic congestion. After the development of Red River Bridge, further traffic increase was anticipated, and development of clover leaf interchange was necessary so as to cope with the situation and Hanoi Ring Road No. 3 could function sufficiently as a ring road. (Realignment of existing rail road was necessary to develop the interchange.)

Vietnamese government originally planned to develop them with its own funds, but they were added to the project scope during phase IV as highly urgent project. They are judged to be appropriate, commensurate with inputs.

The work content of consulting services was carried out as planned. Comparison of planned and actual inputs of consulting services is as shown in Table 3.

Table 3: Comparison of Planned and Actual Inputs of Consulting Services

	Plan	Actual	Comparison
International Consultants	1,032.55MM	1,020.84MM	-11.71MM
Local Consultants	6,982.33MM	7,369.65MM	387.32MM
Total	8,014.88MM	8,390.49MM	375.61MM

Source: Results from questionnaire survey of executing agency

New Phu Dong Bridge (Bridge is shown behind)

A Part of Clover Leaf Interchange and Rail Road after Realignment

3.2.1.2 Hanoi City Ring Road No.3 Construction Project

Table 4 shows the comparison of planned and actual outputs.

Table 4: Comparison of Planned and Actual Outputs

Plan	Actual
Civil Works	
(a) Road	
Ring Road No.3 major road: Total Length: 8.9km (of which length of viaduct: about 8.5km) Number of Lanes: round-trip 4 lanes	As planned
—	Underpasses: 2 places
—	Flyover: 1 place
(b) Interchange	
Interchange construction: 3 places	As planned
Consulting Services	
・Detailed design and assistance in tendering (review of preliminary design, implementation of detailed design etc., assistance in implementation of environmental and social consideration, assistance in tendering, provision of training) ・Construction supervision (construction supervision, assistance in implementation of environmental and social consideration, provision of training)	As planned

Source: Results from questionnaire survey of executing agency

Regarding civil works, underpasses in two places and a flyover in one place were added to the project scope. These additional outputs are not located on the Ring Road No. 3 itself but on the existing road. They were added to meet the traffic demand of the connection point with the section between Trung Hoa Inter Change and Thanh Xuan Inter Change section of Hanoi Ring Road No. 3 and the existing road where the traffic congestion occurred chronically. At the time of appraisal, due to the high importance and urgency, priority was given to the development of the Ring Road No. 3 itself given the budget constraint, however, the above mentioned additional outputs were added to the project scope based on the fact that total project cost of the construction of Ring Road itself was reduced due to the effect of exchange rate fluctuation during the project period.

The work content of consulting services was carried out as planned. Coverage of detailed design, assistance in tendering etc. increased with the addition of the scope of construction work, however, input amount was saved due to the shortened construction period. Specifically, it is as shown in Table 5.

Table 5: Comparison of Planned and Actual Inputs of Consulting Services

	Plan	Actual	Comparison
International Consultants	392.99MM	385.78MM	-7.21MM
Local Consultants	3,026.44MM	2,821.39MM	-205.05MM
Total	3,419.43MM	3,207.17MM	-212.26MM

Source: Results from questionnaire survey of executing agency

Ring Road No. 3 (taken from the ordinary road)

Underpass Constructed on the Existing Road

3.2.2 Project Inputs

3.2.2.1 Project Cost

1) Red River Bridge Construction Project (I) (II) (III) (IV)

As regards total project cost, as mentioned above, comparison was made between phase IV plan at the time of final scope change and the actual. The total project cost in phase IV was planned to be 58,931 million yen (out of which 40,989 million yen was to be covered by Japanese ODA loan). In actuality, the total project cost was 54,368 million yen (out of which 39,153 million yen was covered by Japanese ODA loan), which is lower than planned (92% of the planned amount). The reason why the total project cost was lower than planned was due to the effect of depreciation of local currency, Vietnamese Dong (VND) against yen during the project

implementation period[7]. As mentioned above, although project scope was added during phase IV implementation, as a result of reduction of total project cost due to the effect of exchange rate fluctuation (yen appreciation, VND depreciation), the actual total project cost was still below the planned cost even after considering this scope increase.

2) Hanoi City Ring Road No.3 Construction Project

The total project cost was initially planned to be 33,333 million yen (out of which 28,069 million yen was to be covered by Japanese ODA loan). In actuality, the total project cost was 24,787 million yen (out of which 22,741 million yen was covered by Japanese ODA loan), which is lower than planned (74% of the planned amount). The reason why the total project cost was lower than planned was due to the effect of depreciation of local currency, Vietnamese Dong (VND) against yen during the project period[8]. As mentioned above, underpasses in two places and a flyover in one place were added to the project scope utilizing the fact that overall project cost was reduced. Due to the effect of exchange rate fluctuation (yen appreciation, VND depreciation), the actual total project cost was still below the planned cost even after taking this scope increase into consideration.

3.2.2.2 Project Period

1) Red River Bridge Construction Project (I) (II) (III) (IV)

As regards project period, comparison was made between phase I plan and the actual as mentioned above. At the time of Phase I appraisal, the overall project period was planned as 66 months, from March, 2000 (signing of Loan Agreement) to August, 2005 (completion of construction[9]). The planned project period was 123 months, after adding the planned period of additional scope at the time of phase III appraisal and implementation (from October, 2005 to December, 2007 (27 months)) and planned period of additional scope during phase IV implementation (from July, 2013[10] to December, 2015 (30 months)) (the end of warranty period[11]). Whereas, the actual project period was 219 months, from March, 2000 (signing of Loan

[7] At the time of phase IV appraisal, it was estimated as 1 VND = 0.00703 JPY. However, the actual rate was a weak VND trend as 1 VND = 0.005897 JPY (average rate by IMF between 2000 and 2017)
[8] At the time of appraisal, it was estimated as 1 VND = 0.00759 JPY. However, the actual rate was a weak VND trend as 1 VND = 0.004926 JPY (average rate by IMF between 2008 and 2017)
[9] Excluding warranty period.
[10] Implementation of additional scope was decided in November, 2011. Although the start time is unknown, there is a remark stating “detailed design has already been started” in the JICA provided document of July, 2013 concerning the decision on procurement method of the additional scope. Thus, it is certain that the additional scope started before that time. Therefore, the starting time is set as such since it has started at lease by this time.
[11] According to information provided by JICA, completion of construction was planned in December 2014.

Agreement) to May, 2018 (the end of warranty period[12]) (including implementation period of the additional scope), which is significantly longer than planned (178% of the initial plan)[13]. Loan periods were extended in phase II and IV projects due to project delay. The reason for the extension of phase II is that it took time to select contractors and the start of construction work was delayed. The reason for the extension of phase IV is due to the additional scope of construction of ramps etc. in Gia Lam section. All the project scope other than this additional scope has been completed within the loan disbursement period (August, 2012) before loan extension. Table 6 compares the planned and actual project period. In addition, Table 7 summarizes the original plan and actual construction period for each output.

Table 6: Comparison of Planned Project Period at the Time of Phase I Appraisal and Actual

Item	Plan (At Phase I Appraisal)	Actual (At Ex-post Evaluation)
Detailed design (JICA Technical Cooperation in collaboration with Yen loan cooperation)	–May 2000	–Sept. 2000
Selection of consultants (review of detail design, construction supervision etc.)	Dec. 1999–May 2000 (6 months)	May 2000–Nov. 2000 (7 months)
Consulting services (review of detail design, construction supervision etc.)	Jun. 2000–Aug. 2005 (63 months)	Jan. 2001–Aug. 2016 (188 months)
Land acquisition, resettlement	Jan. 2000–Feb. 2002 (26 months)	Mar. 2000–Mar. 2010 (121 months)
Construction (Red River Bridge)	Jun. 2001–May 2005(48 months)	Nov. 2002–Feb. 2007 (52 months)
Construction (Ring Road No.3)	Mar. 2002–Aug. 2005 (42 months)	Mar. 2005–May 2012 (87 months)
Construction (Ramps etc. in Gia Lam Section)	—	Dec. 2014–May 2018 (42 months)
Infrastructure Development for Resettlement Sites	Dec. 1999–Jul. 2002 (32 months)	Nov. 2002–Jul. 2005 (33 months)

Source: Information provided by JICA, and results from questionnaire survey of executing agency

Note 1) Selection of consultants, land acquisition and resettlement, and infrastructure development of resettlement sites have started before the signing of the loan agreement of the project

[12] Source: Information provided by JICA.
[13] The period up to the start of each additional scope is considered as the preparation period and included in the actual project period.

Table 7: Comparison of Planned and Actual Project Period for Each Output for Red River Bridge Construction Project (I) (II) (III) (IV)

Item	Plan	Actual (At Ex-post Evaluation)
Original Scope (Plan at the time of Phase I Appraisal)		
Red River Bridge	Jun. 2001–May 2005 (48 months)	Nov. 2002–Feb. 2007 (52 months)
Ring Road No. 3 (Gia Lam Section)	Mar. 2002–Aug. 2005 (42 months)	Mar. 2005–Aug. 2009 (54 months)
Ring Road No. 3 (Thanh Tri Section)	Mar. 2002–Aug. 2005 (42 months)	Mar. 2005–Oct. 2010 (68 months)
Additional Scope (Plan at the Time of Phase III Appraisal. As regards Phap Van Viaduct, scope was added during Phase III Implementation (partial extension))		
New Phu Dong Bridge	Jan. 2006–Dec. 2007 (24 months)	Oct. 2008–Jun.2012 (45 months)
Phap Van Viaduct	Oct. 2005–Sept. 2007 (24 months)	Oct. 2008–Oct. 2010 (25 months) (Bridge Section) Oct. 2008–Mar. 2011 (30 months) (Road Section)
Additional Scope (Plan during Phase IV Implementation)		
Ramp etc. in Gia Lam Section	Jul. 2013 (estimation)–Dec. 2014 (18 months)	Dec. 2014–May 2018 (42 months)

Source: All the actual periods are the results from questionnaire survey of executing agency

When comparing planned and actual period of construction work for each output in Table 7, construction periods for Red River Bridge, Gia Lam section, Thanh Tri section, New Phu Duong Bridge widening, Phap Van Viaduct, and ramp etc. in Gia Lam Section have all delayed. Major reason for this was the delay of land acquisition. In fact, looking at Table 6, land acquisition and resettlement has been delayed by 95 months (7 years 11 months), from the initial plan of 26 months prolonged to 121 months, and consulting services (construction supervision) have also delayed significantly.

The background of land acquisition delay were ① change in the administrative division of Hanoi City, and ② delay in land acquisition process. Regarding ①, (1) in 2004, Gia Lam District of Hanoi City where the project site was located was divided into Gia Lam District and Long Bien District, and due to the change of administrative division, delays in administrative procedures such as coordination and approval procedures occurred, (2) due to the merger of Ha Tay Province to Hanoi City in 2008, the administrative management system was reorganized and the Compensation Committee of Hanoi City People's Committee had to be established again. According to the executing agency, the above (1) was announced by the

government in November 2003[14] and it was not foreseeable at the time of the phase I and II appraisal (1999 and 2001, respectively). The above (2) was announced by the government in August 2008[15], and the executing agency explained that it was not foreseeable at the time of the phase III and IV appraisal (2003 and 2005, respectively). Regarding ②, there were cases that it took time to confirm ownership and to adjust among residents because land ownership was unclear. In addition, although it was not for resettlement, there were cases in which it took time for consensus process on compensation amount to the residents who provided part of their farmland. As described later, land acquisition process was properly implemented based on Vietnamese regulations, and unreasonable land acquisition was not carried out.

2) Hanoi City Ring Road No.3 Construction Project

Project period planned at the time of appraisal was 91 months, which is the period totalling the planned period of the original scope from March, 2008 (signing of Loan Agreement) to December, 2011 (completion of construction[16]) (46 months) and the planned period for the additional scope (from May, 2012 to January, 2016) (45 months)[17]. In actuality, the project period was 101 months when totalling the actual period of the original scope from March, 2008 (signing of Loan Agreement) to November, 2012 (completion of construction[18]) and the actual period for the additional scope (from November, 2011[19] to July, 2016), which is longer than planned (111% of the initial plan)[20]. Loan period was extended due to project delay. Table 8 summarizes the comparison of planned and actual project period.

Table 8: Comparison of Planned and Actual Project Period

Item	Plan (At Project Appraisal)	Actual (At Ex-post Evaluation)
Detailed design	Jan. 2008–Jun. 2008 (6 months)	Mar. 2008–Dec. 2009 (22 months)
Consulting services (construction supervision)	Jun. 2009–Jan. 2012 (32 months)	Apr. 2010–Jul. 2016 (76 months)
Bidding, contract	Apr. 2008–Jun. 2009 (15 months)	Sept. 2008–Jun. 2011 (34 months)
Construction (originally planned)	Jul. 2009–Dec. 2011 (30 months)	Jun. 2010–Nov. 2012 (30 months)
Land acquisition	–Dec. 2008	Apr. 2001–Jun. 2010 (111 months)
Underpasses, Flyover (additional)	—	Jul. 2014–Jul. 2016 (25 months)

[14] Legal basis is Decree 132/2003/ND-CP November 6, 2003.
[15] Legal basis is Decision 15/2008/QH12 dated May 29, 2008.
[16] Excluding warranty period.
[17] Information provided by JICA.
[18] Excluding warranty period.
[19] Implementation of additional scope was decided in November, 2011.
[20] The period until the start of the additional scope is considered as the preparation period and included in the actual project period.

Source: Information provided by JICA, and all the actual periods are the results from questionnaire survey of executing agency

Note 1) Detailed design was carried out as part of Red River Bridge Construction Project. Construction supervision was conducted as part of this project.

Note 2) Land acquisition and resettlement was not implemented in this project, but implemented in the side road construction project (phase 1 project) carried out by the Vietnamese government using its own fund prior to this project. This project to construct motor vehicle exclusive road in viaduct is regarded as phase 2 project from the Vietnamese side.

Table 9：Comparison of Planned and Actual Period of Additional Scope

Item	Plan	Actual
Underpasses, Flyover	May 2012–Jan. 2016 (45 months)	Jul. 2014–Jul. 2016 (25 months)

Source: Information provided by JICA, and results from questionnaire survey of executing agency

The main reason for project delay is due to the delay of selection of contractors as a consequence of unsuccessful bidding. As a result of project facilitation of construction work to restore the delay of contractor selection, package 1 construction work was shortened by 15 months and package 2 construction was shortened by 8 months. However, due to the difference in implementation period of both packages, total construction period was 34 months, exceeding the plan (30 months) by 4 months.

3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

Regarding Red River Bridge Construction Project, at the time of appraisal, the economic internal rate of return (hereinafter referred to as “EIRR”) calculated at the time of phase IV project appraisal was 16.73%, on the assumption that vehicle operation cost saving and time saving from the project (Red River Bridge construction portion) to be considered as benefit, project cost (excluding tax) and operation and maintenance cost to be regarded as cost, and project life assumed to be 30 years. The EIRR recalculated at the time of ex-post evaluation[21] turned out to be 8.6%, which is lower

[21] In light of the fact that construction work (ramp etc. in Gia Lam Section, the last construction section) was completed in August 2016 and there was one year of warranty period after completion, benefits of the project as a whole are recalculated from 2017. Traffic volume is expected to increase during project life, applying the increase rate of traffic volume of this project from the completion to 2017 based on the target values for road related indicators etc. in Hanoi City until 2030 shown in the *Hanoi Transportation System Master Plan (-2030)*, and actual passenger and freight traffic by road in Hanoi City. Passenger Car Unit (PCU) used at the time of recalculation is the value obtained by converting the traffic volume including passenger cars, buses, trucks, motorcycles and the like into passenger car traffic volume. PCU conversion coefficients are based on the standards commonly used in Vietnam (National Standard of TCVN 4054-98 of Viet Nam: passenger car = 1.0, bus (less than 25 seats) = 2.0, bus (25 seats or more) = 2.5, truck (biaxial) = 2.0, truck (three-axis) = 2.5, large truck = 4.0, and 40feet container = 4.0). In addition to increase of traffic volume itself, the rate of traffic increase is predicted assuming shifts of vehicle type (shift from passenger cars or the like having smaller PCU

than the figure at the time of phase IV appraisal. The main reason can be attributed to the traffic volume of Red River Bridge, which was lower than the target. When reviewing the EIRR calculation sheet at the time of phase IV appraisal, it can be inferred that calculation did not cover the entire project, but only the Red River Bridge construction portion. On the other hand, the EIRR recalculation at the time of ex-post evaluation covered the entire project.

Regarding Hanoi City Ring Road No.3 Construction Project, the EIRR calculated at the time of appraisal was 12.0%, on the assumption that reduction of vehicle operation cost, reduction of economic loss by time saving, and benefit due to reduction of traffic accidents from the project to be considered as benefit, project cost (construction cost, operation and maintenance cost, excluding tax) to be regarded as cost, and project life assumed to be 30 years. The EIRR recalculated at the time of ex-post evaluation[22] turned out to be 9.9%, which is lower than the figure at the time of appraisal. The main reason can be attributed to the lower traffic volume compared to the target.

In light of the above, as regards Red River Bridge Construction Project (I) (II) (III) (IV), although the project cost was within the plan, the project period significantly exceeded the plan. As regards Hanoi City Ring Road No.3 Construction Project, although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair when considering both projects as one project.

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conversion coefficient to trucks or containers having larger conversion coefficient). Vehicle operation cost is calculated based on the value derived using the model in the executing agency (Highway Development & Management Software). The basis used for calculation at the time of appraisal was not used since it is unknown.

[22] In light of the fact that construction work was completed in January 2013 and there was one year of warranty period after completion, benefits of the project are recalculated from 2014. Traffic volume is expected to increase during project life, applying the increase rate of traffic volume of this project from the completion to 2017 based on the target values for road related indicators etc. in Hanoi City until 2030 shown in the *Hanoi Transportation System Master Plan (-2030*), and actual passenger and freight traffic by road in Hanoi City. In addition to increase of traffic volume itself, the rate of traffic increase is predicted assuming shifts of vehicle type (shift from passenger cars or the like having smaller PCU conversion coefficient to trucks or containers having larger conversion coefficient). Furthermore, it is taken into account that after completion of "Hanoi City Ring Road No.3 Construction Project (Mai Dich - South Thang Long Section)", currently implemented with Japanese ODA loan, convenience of Ring Road No. 3 will be improved and traffic volume is also expected to increase for this project section. According to ex-ante evaluation of this project, service of the road is assumed to start in May 2018. The basis for calculating the PCU conversion coefficients and vehicle operation cost is the same as that of the Red River Bridge Construction Project. The basis used for calculation at the time of appraisal was not used since it is unknown.

3.3 Effectiveness and Impacts[23] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

1) Red River Bridge Construction Project (I) (II) (III) (IV)

Regarding operation and effect indicators, data of the existing surveys carried out by the executing agency was utilized. However, the measurement sections are not the three locations of Red River Bridge, Phap Van Viaduct, and New Phu Dong Bridge which were set at the time of appraisal, but the data of the entire section including them (New Phu Dong Bridge－Red River Bridge－Phap Van Viaduct, which is the scope of this project). (Table 10)

Table 10: Operation and Effect Indicators

	Target			Actual	
	2010			2016	2017
	1 Year After Completion			The Year of Completion[24]	1 Year After Completion
	Red River Bridge	Phap Van Viaduct	New Phu Dong Bridge	Section between New Phu Dong Bridge－Red River Bridge－Phap Van Viaduct	
Annual Average Daily Traffic (PCU/day)	73,130	55,848	20,254	53,134	54,278
Time Saving (Bil.VND/year)	81.49	54.36	31.14	350.69	357.84

Source: Prepared based on the data provided by the executing agency

Note 1) PCU stands for Passenger Car Unit. The value obtained by converting the traffic volume including passenger cars, buses, trucks, motorcycles and the like into passenger car traffic volume.

Note 2) Time saving is calculated by multiplying the shortened time by the time value.

Since completion of construction[25], when the project effects occur, was in August 2016, the target year is 2017 – one year after completion. Annual Average Daily Traffic of the project target section is regarded as an indicator because the project

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

[24] The year of completion indicated here is the year of project completion when the project effects occur, defined at the time of Phase I appraisal when the target values were established.

[25] Excluding warranty period.

aimed to mitigate congestion in Hanoi City and the surrounding areas by converting traffic volume to this project. The actual traffic volume is nearly the same level as the target figure of Phap Van Viaduct, about 74% of the target figure of Red River Bridge, and about 2.7 times the target figure of New Phu Dong Bridge. It is thought that the reason why the actual figure was about 74% of the target figure of Red River Bridge is that, in addition to this project, at the time of ex-post evaluation, there are bridges crossing the Red River which had been constructed after the appraisal of this project, such as Vinh Tuy Bridge and Nhat Tan Bridge (developed by Japanese ODA loan), and thus the traffic was dispersed to these other bridges. It is inferred that the actual figure was about 2.7 times the target value of New Phu Dong Bridge because there are no alternative bridges developed in the neighboring area. As for time saving, the actual figure is much higher than the target at the time of appraisal, which is about 4.3 times the Red River Bridge target and about 11.5 times the New Phu Dong Bridge target.

Based on the above, it can be considered that the effects as planned are largely achieved.

2) Hanoi City Ring Road No.3 Construction Project

As regards this project, data of the existing surveys carried out by the executing agency was also utilized. The measurement section is the same as the section set at the time of appraisal for time saving. However, for Annual Average Daily Traffic, data on the section from Mai Dich Interchange to North Linh Dam Lake (Phap Van Viaduct section), which is the scope of this project, is used, and not the data between Trung Hoa Inter Chance and Thanh Xuan Inter Change (where traffic volume was expected the most in the project section). (Table 11)

Table 11: Operation and Effect Indicators

	Target	Actual		
	2014	2015	2016	2017
	2 Years After Completion	2 Years After Completion	3 Years After Completion	4 Years After Completion
Annual Average Daily Traffic (PCU/day)	95,000	75,736	78,103	80,575
Time Saving (Hour/PCU)	0.31	0.48	0.48	0.48

Source: Prepared based on the data provided by the executing agency of survey

Note 1) PCU stands for Passenger Car Unit. The value obtained by converting the traffic volume including

passenger cars, buses, trucks, motorcycles and the like into passenger car traffic volume.

Note 2) Target figure of Annual Average Daily Traffic was between Trung Hoa Inter Chance and Thanh Xuan Inter Change where traffic volume was expected the most in the project section when dividing the project section into three.

Note 3) Target section of actual Annual Average Daily Traffic is the section from Mai Dich Interchange to North Linh Dam Lake (Phap Van Viaduct section) which is the scope of this project.

Note 4) Time saving is calculated by multiplying the shortened time by the time value. The unit is time/PCU, which is the same set at the time of appraisal.

Note 5) Target section for time saving for target figure and the actual is the section from Mai Dich Interchange to North Linh Dam Lake, which is the scope of this project.

Since completion of construction[26], which is the definition of project completion, was in January 2013, the target year is 2015 – two years after completion. The actual figure of Annual Average Daily Traffic is 79.72% of 95,000 PCU/day between Trung Hoa Inter Chance and Thanh Xuan Inter Change where traffic volume was expected the most in the project section. Regarding time saving, the measurement section is the same as the section set at the time of appraisal, which is about 1.5 times the target figure.

Based on the above, it can be considered that the effects as planned are largely achieved.

3.3.1.2 Qualitative Effects (Other Effects)

As qualitative effects of both projects, alleviation of traffic congestion in Hanoi City and improvement of logistics in the northern part of Vietnam were expected. In order to verify this assumption, interview survey was conducted to beneficiaries surrounding both projects (staff members of local enterprises (Japanese companies and local companies), drivers, relevant staff members of executing agencies of "Power Transmission and Distribution Network Development Project" for which ex-post evaluation is conducted at the same time (staff members of Northern Power Corporation, Hanoi Power Corporation, Hai Duong Power Corporation and Hai Phong Power Corporation), totaling 25 people (female: 4, male: 21[27]). As a result, all the interviewees responded that after project implementation, traffic volume of heavy vehicles such as trucks was dispersed to Ring Road No. 3 and Red River Bridge, and thus, traffic congestion in Hanoi City center was alleviated. In addition, although

[26] Excluding warranty period.

[27] Considering gender balance, request was made to interview women when making appointments, however, those who could respond at the time of visit and could respond appropriately to questions were biased to men.

there were variations in the usage situation of Ring Road No. 3 and Red River Bridge due to positional relationship with the location of companies/factories, suppliers, customers, etc., beneficiaries who frequently use both projects pointed out that both projects are contributing to the improvement of logistics in northern part of Vietnam, including improved access to Hanoi Airport and Hai Phong Port. For example, it was pointed out that prior to the project, it took four hours one way to travel from Hanoi City center to Hai Phong Port, crossing the Red River with Chuong Duong Bridge through Hanoi City and using National Highway No. 5. However, after the project, travel time is reduced to two hours one way, by crossing the Red River with Red River Bridge on Ring Road No. 3 and using newly developed Hanoi-Hai Phong Expressway, making it much easier to move on a day trip. It was pointed out that although time saving was greatly affected by the development of an expressway, travel time from Hanoi City until crossing Red River Bridge was shortened at least by 30 minutes, utilizing both projects. Furthermore, multiple beneficiaries indicated that due to the development of clover leaf interchange in Gia Lam section, chronic congestions in the section have been solved and smooth travel has realized.

Therefore, based on the analysis results of quantitative effect and results of interview to beneficiaries, it can be considered that both projects contribute to alleviating traffic congestion in Hanoi City and improving logistics in the northern part of Vietnam.

BOX 1: Results of Satisfaction Survey Targeting Japanese Companies

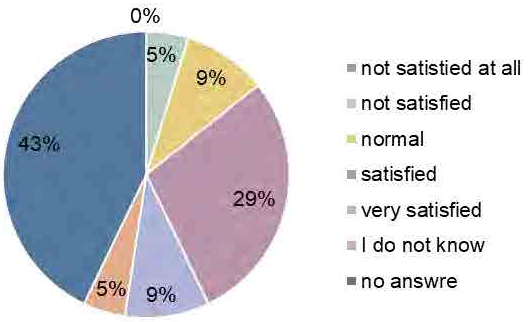
With particular attention to “the development of regional economies by securing smooth road transportation” which is set as an impact in the objectives of both projects, this satisfaction survey targeted Japanese companies to analyze the effects of both projects on their business environment. Questionnaires were distributed to 686 member companies via the Japanese Business Association in Vietnam. In this survey, among 120 sample companies randomly selected in order to obtain responses representing the characteristics of 686 companies that are the population, analysis was made for 50 companies, for which valid responses were finally obtained.

◆Result of the Survey

As a result of analyzing the valid 50 responses, 38% (16 companies) out of the 42 companies that use Red River Bridge and Ring Road No. 3 responded “very satisfied” or “satisfied”, and the reasons for this satisfaction were “avoiding traffic jams in Hanoi City”, “improving access between Hanoi City and neighboring provinces / cities”, “suppressing exhaust gas in Hanoi City”. There was no answer for “not satisfied at all”. On the other hand, 20 out of 42 companies (48%) answered “I do not

know" and "no answer", which exceeds the number of companies that answered "very satisfied" or "satisfied".

The main reason was that the frequency of using both bridge and road for business is low. Companies using either "road / bridge" or "one or the other" even if the frequency of use is low, and not responding "satisfied", mentioned that the reason for the answer was "because the traffic is always congested", "the surface of bridge and road is rough". In addition, 44% (11 companies) out of 25 companies which were founded before 2010 and use Red River Bridge and Ring Road No. 3, which are expected to be able to compare before and after implementation of both projects, answered "very satisfied" or "satisfied", which is the higher percentage than the above (16 out of 42 companies). There were many qualitative responses from 8 companies that realized the face-to-face interview to evaluate the effects of both projects positively. Specifically, except for 1 out of the 8 companies, there were responses that they realized the mitigation of traffic congestion and the time saving effect. On the other hand, one company that responded "not realized the improvement" in the face-to-face interview answered that "frequency of use is low, so we do not realize much about time saving effect" and it can be considered that low use frequency of both projects is less likely to lead to realization of improvement effect. It should be noted that these companies are interested in both projects and are cooperative in the survey, but it can be considered that these responses support the judgment of effectiveness and impact in this ex-post evaluation. Also, in order to confirm the synergistic effect of both projects, as a result of inquiries as to whether the time is shorted to travel from Gia Lam District in eastern Hanoi City (the district near the eastern end of Red River Bridge Construction Project) to Mai Dich District in the west (the district in the vicinity of the west end of Hanoi Ring Road No.3 Construction Project) by avoiding moving in the central part of Hanoi City, 77% (27 companies) of the 35 companies using both Red River Bridge and Ring Road No.3 answered "shortened".



Source: Prepared based on the results of satisfaction survey

3.3.2 Impacts

3.3.2.1 Intended Impacts

As impacts of both projects, development of regional economy through securing smooth road transport was anticipated. Since these macro changes are also affected by factors other than both projects, it is difficult to verify direct correlation, however, in order to confirm the assumption at the time of appraisal, transition of Gross Domestic Regional Product (hereinafter referred to as "GDRP"), industrial production, and foreign direct investment (hereinafter referred to as "FDI") in Hanoi City over the previous year was analyzed. (Table 12)

Table 12: Year-on-Year Growth Rate of GDRP, Industrial Production and FDI in Hanoi City

	2012	2013	2014	2015	2016	2017
GRDP Increase (%)	8.1	8.3	8.8	9.2	8.2	8.5
Industrial Production Increase (%)	5.1	4.5	4.6	8.3	7.1	6.7
FDI Increase (%)	10.9	11.3	18.4	1.9	2.4	6.1

Source: Results from questionnaire survey of executing agency (original data is from the General Statistics Office of Vietnam and the Center Statistics Office of Hanoi)

Note) Data in 2017 is from January to September.

GDRP, industrial production and FDI have all increased year-on-year – GRDP has been in the range of 8 to 9% increase, and industrial production is in the range of 4 to 8% increase. With respect to FDI, figures have changed by two digits between 2012 and 2014. Although the increase rate has greatly dropped in 2015, the increase rate has expanded since 2016, showing V-shape recovery. In addition, according to interviews with local companies, surrounding areas were farmlands before the implementation of both projects, but commercial areas and residential areas were developed after the project, and development of industrial zones has also progressed and urban development has been promoted.

In light of the above, it can be considered that both projects are contributing to the development of regional economy.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Natural Environment

Both project falls under A category of JBIC Guidelines for Confirmation of Environmental and Social Considerations (October 1999 and April, 2002, respectively) because they are development project of large-scale bridges and roads.

For both projects, executing agencies have prepared environmental management plans in accordance with *the Environmental Impact Assessment (EIA) reports*, and have periodically conducted environmental monitoring during project implementation based on the plans. Specifically, Scientific and Technological Center for Environmental Protection in Transportation (CEPT) which belongs to the Institute of Transport Science and Technology (ITST) under the Ministry of Transport has conducted the Environmental Monitoring. According to the executing agency, the monitoring items are soil (including excavated soil treatment), water quality, air, noise, vibration, etc., and observation points are more than 20 for Red River Bridge Construction Project, and about 10 for Hanoi City Ring Road No.3 Construction Project. According to the executing agency, there was no big problem overall on the monitoring results, but there were cases where noise and air (dust) exceeded the standards, and mitigation measures such as watering the project site, washing tires of construction vehicles, regulating noise of construction equipment during construction in the middle of the night, etc. were carried out. No environmental monitoring has been conducted at the time of ex-post evaluation. Based on interviews with local residents[28], there is no particular problem with regard to soil, water quality, air, noise, vibration, etc. during project implementation and after project completion (there are dust and noise with increasing traffic volume, but within the acceptable level, not to be worried).

In light of the above, no particular problem has been reported on the impact on the natural environment.

2) Resettlement and Land Acquisition

① Red River Bridge Construction Project (I) (II) (III) (IV)

Results of resettlement and land acquisition are summarized in Table 13. Actual number of resettled households was 1,244, slightly more than 1,200 households initially expected at the time of appraisal.

[28] Interviews were conducted to 11 resettled residents who were affected by the project (11 residents of 10 districts living in the resettlement sites, four women and seven men).

Table 13: Results of Resettlement and Land Acquisition

Resettlement Sites (District Name)	Land (m^2)	Resettlement (Household)
X1	38,395	166
X2a	115,305	362
X2b	45,446	271
X3	51,641	274
X4	13,338	44
X5	10,813	14
X6	17,412	38
X6a	4,974	10
X7	8,794	28
X8	10,875	37
Total	316,993m^2 = 31.7ha	1,244

Source: Results from questionnaire survey of executing agency

According to the executing agency, all relocated residents had opted to move to the resettlement sites. Resettlement sites (Figure 2) are located as close as possible to the original place of residence, and consideration is given as much as to minimize negative effects, such as enabling the entire community to relocate to the same site. According to the executing agency, resettlement and land acquisition were carried out based on the rules of Vietnam[29]. Specifically, Hanoi People's Committee has established a Compensation Committee (the executing agency is also a member of this Committee) and prepared land acquisition/resettlement plan. Public hearings and consultation, and negotiation on the compensation amount to the affected residents were carried out repeatedly.

[29] Decree No. 22/1998/ND-CP (April 24, 1998) of Vietnamese government and Decision No.20/1998/QD-UB (April 24, 1998) of Hanoi City People's Committee.
Decree No. 197/2004-ND-CP (December 3, 2004) of Vietnamese government and Decision QD18/2008/QD-UNBD (September 29, 2008) of Hanoi City People's Committee.

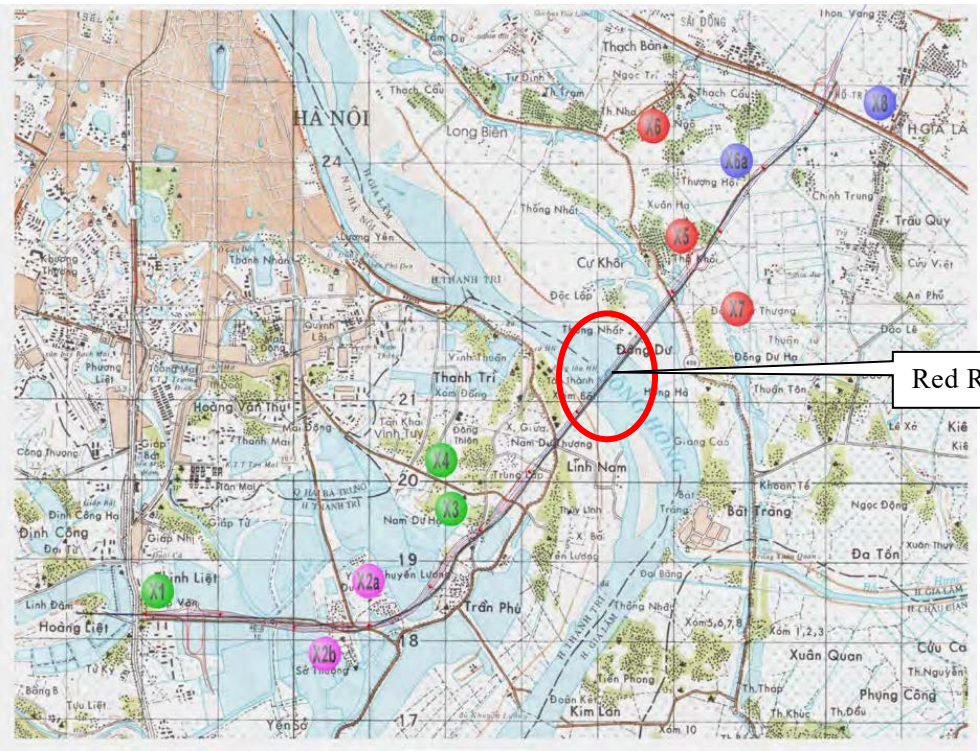


Figure 2: Resettlement sites of Relocated Residents

Source: Prepared from the information provided by executing agency

According to the interview with the executing agency and affected residents[30], there were cases in which it took time to confirm the ownership and make adjustment between residents because land ownership was unclear with respect to land acquisition process. In addition, although it was not for resettlement, but there were cases in which it took time for consensus process on compensation amount for residents who provided part of their farmland. According to the executing agency, final agreement was reached after carefully explaining the project purpose and the importance of the project. Rresidents who have relocated to the resettlement sites presented their opinion that they did not have any particular objection to the compensation amount, infrastructure etc. of resettlement sites are developed by this project, and thus they are entirely satisfied with their current life.

[30] The same 11 residents described in footnote 28.

Resettlement Site (X2a District)

Resettlement Site (X6 District)

② Hanoi City Ring Road No.3 Construction Project

As described above (Table 8, Note 2 of "Project Period" under Efficiency), land acquisition and resettlement were carried out by the construction project of side road which Vietnamese government has implemented with their own fund (phase 1 project), prior to this project. This project, constructing an exclusive road for motor vehicles as viaduct, is regarded as phase 2, and land acquisition and resettlement were not carried out in this project. Under phase 1 project, 2,186 households were relocated and 98ha of land was acquired, which was almost as planned.

According to the executing agency, resettlement and land acquisition were carried out based on the rules of Vietnam just like Red River Bridge Construction Project. In phase 1 project, securing resettlement sites and social infrastructure development were not carried out, and those who wished have moved to municipal apartments developed by Hanoi City. Relocated residents are said to have purchased apartments utilizing compensation they received. As with Red River Bridge Construction Project, it was said that there were cases in which it took time to confirm land ownership and to coordinate among residents, as well as cases where it took time for consensus process on compensation amount.

3) Measures Against HIV/AIDS Infections for Construction Workers and Others

Contractors of both projects commissioned contracts with local NGO, Center for Development of Community and Children (CDECC), and carried out activities to cope with HIV/AIDS infections for construction workers and others. Main contents of the program were; (1) provision and dissemination of information on HIV/AIDS infection control measures to construction workers and residents around construction

sites, (2) peer education[31] for construction workers, (3) holding events to promote understanding on the importance of measures against HIV/AIDS infection, (4) promoting distribution and use of condoms, and (5) developing a system for counseling, examination and treatment of sexually transmitted diseases for construction workers. According to the executing agency, knowledge and understanding of HIV/AIDS infection control measures have deepened for construction workers and residents around construction sites etc., and all construction workers took medical examinations.

As mentioned above, regarding Red River Bridge Construction Project, although the actual figure of traffic volume was less than 80%, about 74% of the target figure of Red River Bridge, among the target figures of three points set at the time of phase IV appraisal, when taking into account that it is the figure after the traffic has been dispersed to other new bridges (Vinh Tuy Bridge and Nhat Tan Bridge) which have been constructed after the appraisal of this project, it can be regarded that the target has been sufficiently achieved[32]. The actual figure for time saving has greatly exceeded the target values for all three points. For Hanoi City Ring Road No.3 Construction Project, the actual traffic volume is 79.72% of the target, slightly less than 80%, however, it is judged that the project has achieved the target when considering the results of hearings to beneficiaries. The actual figure for time saving greatly exceeded the target set at the time of appraisal. As for the impact, it is considered that sufficient effects have come out based on the trend of statistical data related to the regional economy and the results of interviews with local companies and others. In light of the above, both projects have largely achieved their objectives as planned. Therefore effectiveness and impacts of the projects are high.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

The operation and maintenance after project completion is undertaken by Hanoi Department of Transport (hereinafter referred to as “Hanoi DOT”) under Hanoi People’s Committee. At the time of appraisal, operation and maintenance was to be handled by

[31] Peer education is an educational method to train a few people as peer educators from groups with common occupation, generation, educational level, socio-economic situation, cultural background etc., and peer educators think and learn together while sympathizing and sharing with their colleagues.

[32] It is relevant to consider dispersion of traffic to new bridges when setting target at the time of phase IV appraisal, however, it seems to have been difficult at that stage to concretely predict their construction (or to simulate their concrete effects). Although it is confirmed from the executing agency and local hearing results that traffic volume of Red River Bridge is dispersed to new bridges, traffic volume thought to be dispersed cannot be grasped. (Reference information) The target figure of Annual Average Daily Traffic of Nhat Tan Bridge, developed by Japanese ODA loan, after two years of completion is 65,821 PCU/day. (Nhat Tan Bridge opened in 2015)

Regional Road Management Unit 2 (hereinafter referred to as "RRMU 2") under Vietnam Road Administrative Bureau (hereinafter referred to as "VRA"), which is the subordinate organization of the Ministry of Transport. However, as a part of government's decentralization policy, jurisdiction was changed in Hanoi City. The major reason was that since both projects are located in Hanoi City, and the Ring Road is connecting to many other transport infrastructures operated and managed by Hanoi DOT, it was necessary to secure coordination and collaboration with operation and maintenance of other transportation infrastructure.

Operation and Maintenance work of both projects are handled by Transport Infrastructure Maintenance Board under Hanoi DOT, and the Board outsources actual operation and maintenance activities on site. Specifically, Hanoi Traffic Engineering 2 Joint Stock Company (hereinafter referred to as "Company 2") is in charge of operation and maintenance of Hanoi City Ring Road No.3 Construction Project on site, and Hanoi Traffic Engineering Joint Stock Company (hereinafter referred to as "Company 3") is in charge of operation and maintenance work of Red River Bridge Construction Project on site, and Transport Infrastructure Maintenance Board is supervising Company 2 and 3[33].

According to Hanoi DOT, coordination with other transportation infrastructure that form Hanoi City urban transport network became easier with more efficient decision making and collaboration with other related organizations as a result of transferring operation and maintenance of both projects to Hanoi DOT. However, specific cost norm for operation and maintenance work for both projects has not been established at the time of ex-post evaluation, and Transport Infrastructure Maintenance Board is outsourcing the work to Company 2 and 3 referring to similar road and bridge cost norms[34]. According to Hanoi DOT, the first large-scale inspection of both projects is scheduled for around 2019, and establishment of cost norm is necessary in order to carry out comprehensive repair, however, its prospect is unknown. In addition, it is pointed out that outsourcing to Company 2 and 3 has been carried out with direct contract until 2017, but competitive bidding will be introduced from 2018 onward and preparation of bid documents and selection process will take place referring to cost norms of similar roads and bridges until concrete cost norm is established. At the time of ex-post evaluation, number of staff in charge of operation and maintenance work of transportation infrastructure in Hanoi DOT is 88 (including one director and three deputy directors). According to Company 2, among 281 total staff, 21 staff are engaged

[33] Company 2 and 3 were originally under the umbrella of Hanoi DOT, but were reorganized as Joint Stock Company as part of state-owned enterprise reform by the Vietnamese government (equitization with a view to future privatization of state-owned enterprises) and thus, the works are outsourced to these companies through Transport Infrastructure Maintenance Board under Hanoi DOT.

[34] According to Hanoi DOT, cost norm of Vinh Tuy Bridge in Hanoi City is referred to for Red River Bridge.

in operation and maintenance work of Ring Road No. 3, of which 13 are technical staff. According to Company 3, among 45 total staff, 33 staff are engaged in operation and maintenance work of Red River Bridge Construction Project, of which 7 are technical staff. According to Company 2 and 3, technical staff engaged in the operation and maintenance of each project are also concurrently in charge of other tasks, and they are deployed according to the work volume.

In light of the above, it is judged that there are some problems in the institutional aspect of operation and maintenance for both projects.

3.4.2 Technical Aspect of Operation and Maintenance

Staff who have acquired sufficient technology and experiences on operation and maintenance of roads and bridges are deployed for both projects. According to Hanoi DOT, the average number of years of staff engaged in operation and maintenance of transportation infrastructure is about 15 years, and the average years of engagement of staff in operation and maintenance in Company 2 and 3 is about 17 years. According to Company 2 and 3, training is carried out every year for staff in charge of operation and maintenance by inviting experts from outside such as vocational training schools. Contents of training relate to new laws and regulations (e.g., new regulations on road signs etc.) and new technologies (e.g., ICT communication system between stakeholders, etc.) in addition to training on operation and maintenance itself. In addition, on the job training (OTJ) by senior staff to young staff is undertaken, and technology and skills of operation and maintenance are being shared. Therefore, no particular problem has been identified regarding regular repair.

On the other hand, the first large-scale inspection has not come yet (planned around 2019) for both projects, and it is unknown whether Hanoi DOT will be able to cope with the planning of comprehensive repair and technical issues in the future.

In light of above, although no particular problem has been identified concerning regular repair, there is unknown part regarding comprehensive repair which is expected to be carried out in the future. Also, since organizations responsible for operation and maintenance on site will be decided through competitive bidding after 2018, attention should be paid that Company 2 and 3 may not necessarily receive orders.

3.4.3 Financial Aspect of Operation and Maintenance

Operation and maintenance cost of roads and bridges in Hanoi City is decided based on the necessary amount of each project based on the Decision of Hanoi People’s

Committee[35]. Fund source is from the Hanoi Road Maintenance and Management Fund[36] established by Hanoi People's Committee. It is also partly sourced from the budget allocated to People's Committee from the national finance every year.

Tables 14 and 15 show the budget, actual allocation and actual expenditure of operation and maintenance costs for both projects. Although upward trend has seen for both projects, these costs cover only a part of work such as regular operation and maintenance work and repair that should be handled preferentially from the viewpoint of traffic safety etc. (For example, repair of dents and cracks on road pavement and replacement of joints of Red River Bridge. See below.) As described below (3.4.4 Status of Operation and Maintenance), heavy-duty trucks are partly obstructed, such as dropping speed at some part, and regular operation and maintenance costs are not necessarily sufficient. This is because even if budget requests for necessary amount is made regardless of the Decision No. 1531/QD-UBND, the actual situation is that sufficient allocation is not realized by Hanoi People's Committee. In addition, as mentioned above, the first large-scale inspection for both projects is planned around 2019, and it is assumed that comprehensive repair will be carried out every five years, however, necessary cost norm has not been established and there is no concrete prospect of budgeting and securing budget.

Table 14: Operation and Maintenance Cost of Red River Bridge Construction Project

(Unit: million VDR)

	2015	2016	2017
Budget (Requested Amount)	10,000	10,500	11,000
Actual Allocation	10,000	10,500	11,000
Actual Expenditure	10,000	10,500	11,000

Source: Results from questionnaire survey of Hanoi DOT

Note 1) For budget, actual allocation and actual expenditure of each year, 3,000 million VND is sourced from the national account, and the remaining is allocated from Hanoi Road Maintenance and Management Fund.

[35] Decision No. 1531/QD-UBND, March 3, 2017.
[36] Hanoi Road Maintenance and Management Fund is a non-profit national fund, sourcing from the Central Road Maintenance Fund, Road Usage Charge, and Road Usage Fee. Based on Decision No.1174/QD-UBND (February 27, 2014)

Table 15: Operation and Maintenance Cost of Hanoi City Ring Road No.3 Construction Project

(Unit: million VDR)

	2015	2016	2017
Budget (Requested Amount)	9,000	10,000	11,500
Actual Allocation	9,000	10,000	11,500
Actual Expenditure	9,000	10,000	11,500

Source: Results from questionnaire survey of Hanoi DOT

Note 1) For budget, actual allocation and actual expenditure of each year, 3,000 million VND is sourced from the national account, and the remaining is allocated from Hanoi Road Maintenance and Management Fund.

In anticipation of increase in traffic volume in the future, current budget is not sufficient for appropriate operation and maintenance, and further budget needs to be secured.

Therefore, it is judged that there are some problems with respect to financial aspect of operation and maintenance.

3.4.4 Status of Operation and Maintenance

According to interviews with Company 2 and 3 and project site survey during the field study, pavement dents and cracks are seen due to increased traffic volume and passage of overloaded vehicles, and repair with plastic cement is carried out. In addition, according to hearing to Company 3 and project site survey, deterioration of rubbers[37], expansion device, at the joint of Red River Bridge is progressing, and it is necessary to replace them with steel one after another. Although 15 places have already been replaced, it is pointed out that it takes time to replace all the remaining 13 rubbers due to budget constraint. According to interviews with companies, it is pointed out that heavy-duty trucks are dropping speed at the deteriorated parts.

As mentioned above, operation and maintenance work mainly focuses on regular work and repairs that should be handled preferentially from the viewpoint of traffic safety. Specifically, inspections of pavement road surfaces, traffic signs, fences, bridges and roads in general are carried out, and inspections of bridge end vertical girders (stringers) etc. are conducted on a monthly basis.

Major spare parts are concrete, asphalt, plastic cement and they are stored in the warehouse of Company 2 and 3. In addition, steel material of expansion device at the joint of Red River Bridge can be obtained in 12 to 15 days after placing order. All the

[37] Lifespan of rubber expansion device is said to be about 5 years.

spare parts can be procured in Vietnam, and they have been available in a timely manner so far.

In light of the above, there are some issues that have not been able to cope with regarding operation and maintenance, due to budget constraints.

Some minor problems have been observed in terms of the institutional aspect and financial aspect. Therefore sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Both projects aimed to respond to the increasing traffic demands in Hanoi City and the surrounding areas through the construction of Red River Bridge, New Phu Dong Bridge and Phap Van Viaduct of the Hanoi City Ring Road No. 3 by "Red River Bridge Construction Project (I) (II) (III) (IV)", and through the construction of a road in the section between its intersection with National Highway No. 32 and the North of Linh Dam Lake by "Hanoi City Ring Road No.3 Construction Project". Both projects aimed at eliminating the bottleneck of road traffic in Hanoi City and improving logistics efficiency are consistent with the country's development policy, development needs as well as with Japan's ODA policy that set out support for economic infrastructure development. Therefore, the relevance of the projects is high. With regards to efficiency, it is judged to be fair when both projects are summed as one project. Regarding project effectiveness, when taking into account the analysis results on quantitative effects of both projects (for Red River Bridge Construction Project, the actual traffic volume was a little lower than 80% of the target value at one point, however, when considering that it is the traffic volume after the traffic was dispersed to other new bridges which were developed after the appraisal of the project, it can be regarded that the target has been sufficiently achieved. The actual result of time saving greatly exceeded the target values for all of the three measurement points. For Hanoi City Ring Road No.3 Construction Project, the actual traffic volume is slightly less than 80% of the target value, however, it is judged that it has achieved sufficiently when taking into consideration the results of hearings to beneficiaries. The actual result of time saving greatly exceeded the target value set at the time of appraisal) as well as results of interviews with beneficiaries, it can be considered that both projects are contributing to alleviating traffic congestion in Hanoi City and improving logistics in the northern part of Vietnam. In addition, impact that both projects contribute to the development of the regional economy by securing smooth road transport is also seen; thus, effectiveness and impact are high. No particular big problem has been reported on the impact on natural environment, and resettlement and land acquisition process has been

properly implemented based on the relevant regulations in Vietnam and thus there is no problem. Regarding operation and maintenance, some minor problems have been observed in terms of the institutional aspect and financial aspect. Therefore sustainability of the effects generated by both projects is fair.

In light of the above, both projects are evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

None

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Points to be noted when setting operation and effect indicators at the time of appraisal for new projects

Regarding operation indicator of Red River Bridge Construction Project, the actual traffic volume was a little lower than 80% of the target value at one point (Red River Bridge). This is because traffic volume was dispersed to other new bridges which were developed after phase IV appraisal of the project. However, it can be inferred that it was difficult at the time of phase IV appraisal to specifically predict such new construction (or to simulate concrete influence) when setting the target values. Normally, road and bridge construction projects are to develop a part of the entire road transport network. Therefore, it is relevant to take into consideration other road and bridge development plans that may affect the effectiveness of the project in the future when setting target values of operation and effect indicators. Therefore, it is important that JICA confirms the target values of operation and effect indicators to the executing agency and formulate common recognition with them with sufficient consideration of future road transport network development plans etc., at the time of appraisal of new road and bridge construction projects.

Necessity of sufficient institution development prior to business transfer

In Vietnam, decentralization policy is progressing, and delegation of authority has been carried out to subordinate government organizations and local authorities. For both projects, operation and maintenance work after project completion has been transferred to Hanoi DOT under Hanoi People's Committee, not RRMU 2 under VRA within the Ministry of Transport, that had been assumed at the time of appraisal. As a result, coordination with other transportation infrastructure that form Hanoi City urban transport network became

easier with more efficient decision making and collaboration with other related organizations. However, problems also occurred on the other hand. Cost norm for operation and maintenance work specifically for both projects has not been established by Hanoi People's Committee at the time of ex-post evaluation. For this reason, if this goes on, there is a fear that large-scale inspection and comprehensive repairs cannot be carried out, and Hanoi DOT will be able to implement only a part of work such as regular operation and maintenance work and repair that should be handled preferentially from the viewpoint of traffic safety etc. Therefore, not only for the case of decentralization, but also when transferring authority of operation and maintenance work of projects that were developed and completed by JICA support or transferring responsible work to local authorities etc., (i.e., when project execution agency and operation and maintenance agency are different), it is important that government establishes sufficient system for implementing necessary work (development of institutional aspects such as personnel, decision making, coordination with related organizations, cost norms etc.) and sufficient mechanism for securing and executing budget before project completion so that transferred operation and maintenance work will be carried out without problems.

End

Comparison of the Original and Actual Scope of the Projects

Item	Plan	Actual
1. Project Outputs	Red River Bridge Construction Project (I) (II) (III) (IV) 1) Civil Work a) Bridge Construction ・ Red River Bridge (New Construction) Bridge Length: 3.1km, Number of Lanes: out-bound/in-bound 6 lanes b) Approach Road (New Construction) ・ Thanh Tri Section (section between National Highway No.1 and Red River Bridge) Bridge Length: 6.6km, Number of Lanes: round-trip 4 lanes, Number of Interchanges: 3, Toll plaza: 1 ・ Gia Lam Section (section between National Highway No.5 and Red River Bridge) Bridge Length: 3.6km, Number of Lanes: round-trip 4 lanes, Number of Interchanges: 2 ・ Total number of bridges for Thanh Tri Section and Gia Lam Section: 7 c) Development of Infrastructure in Resettlement Area ・ Infrastructure development in resettlement areas (6 places) (road, drainage, distribution line, water supply etc.) 2) Consulting Services ・ Assistance in tendering and construction supervision etc. ・ Provision of training to maintenance engineers,	Red River Bridge Construction Project (I) (II) (III) (IV) 1) Civil Work a) Bridge Construction ・ As planned <Additional scope> ・ Phap Van Viaduct construction (new construction) and partial extension ・ New Phu Dong Bridge widening b) Approach Road (New construction) ・ Thanh Tri Section (Cancellation of toll plaza in 1 place. Others are as planned) ・ Gia Lam Section (as planned) ・ Bridges for Thanh Tri Section and Gia Lam Section were changed to 4 bridges, 2 flyovers and 1 viaduct c) Development of Infrastructure in Resettlement Area ・ Infrastructure development in resettlement areas (10 places) (road, drainage, distribution line, water supply etc.) 2) Consulting Services ・ As planned ・ As planned

	preparation of maintenance manual, assistance in environmental measures Hanoi City Ring Road No.3 Construction Project 1) Civil Work ・ Ring Road No.3 major road: Total Length: 8.9km (of which length of viaduct: about 8.5km) Number of Lanes: 4 lanes ・ Interchange construction: 3 places 2) Consulting Services ・ Detailed design and assistance in tendering ・ Construction supervision	 Hanoi City Ring Road No.3 Construction Project 1) Civil Work ・As planned ・As planned <Additional scope> ・ Underpasses: 2 places ・ Flyover: 1 place 2) Consulting Services ・As planned ・As planned
2. Project Period	Red River Bridge Construction Project (I) March, 2000 – August, 2005 (66 months) Hanoi City Ring Road No.3 Construction Project March, 2008 – December, 2011 (46 months)	Red River Bridge Construction Project March, 2000 – May, 2018 (219 months) Hanoi City Ring Road No.3 Construction Project March, 2008 – July, 2016 (101 months)
3. Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total ODA Loan Portion Exchange Rate	Red River Bridge Construction Project (IV) 19,969 million yen 38,962 million yen (5,542,248 million VND) 58,931 million yen 40,989 million yen 1VND=0.00703 yen (As of October, 2005)	Red River Bridge Construction Project — — — 54,368 million yen 39,153 million yen 1VND=0.005897 yen (Average between 2000 and 2017)

	Hanoi City Ring Road No.3 Construction Project	Hanoi City Ring Road No.3 Construction Project
Amount Paid in Foreign Currency	11,334 million yen	－
Amount Paid in Local Currency	21,999 million yen （2,898,419 million VND）	－ －
Total	33,333 million yen	24,787 million yen
ODA Loan Portion	28,069 million yen	22,741 million yen
Exchange Rate	1VND=0.00759 yen (As of October, 2007)	1VND=0.004926 yen (Average between 2008 and 2017)
4. Final Disbursement	Red River Bridge Construction Project (I): July, 2007 Red River Bridge Construction Project (II): July, 2011 Red River Bridge Construction Project (III): August, 2010 Red River Bridge Construction Project (IV): August, 2017 Hanoi City Ring Road No.3 Construction Project: January, 2017	

End

Socialist Republic of Viet Nam

FY2017 Ex-Post Evaluation of Japanese ODA Loan Project

"Power Transmission and Distribution Network Development Project"

External Evaluator: Masumi Shimamura,

Mitsubishi UFJ Research and Consulting Co., Ltd.

0. Summary

This project newly constructed and strengthened power transmission and substation facilities and as well as improved distribution lines in industrial zones and the surrounding areas of Vietnam's principal urban areas with the aim of ensuring stable power supply to meet the rapidly growing power demand and reducing loss in power transmission and distribution. The objective of the project aiming at providing efficient and stable power supply to build a foundation for achieving Vietnam's industrialization is well consistent with the development policy and development needs of the country, as well as with Japan's ODA policy which put up active support for economic infrastructure development. Therefore, the relevance of the project is high. Regarding project implementation, both the project cost and project period exceeded the plan. Therefore, efficiency of the project is fair. Regarding project effectiveness, availability factor indicating the operation status against the rated value of facilities in the pilot area (Yen My District, Hung Yen Province) temporarily achieved the target, but the rate of load has been increasing given the background of rapidly increasing power demand in the area. However, actual figures of availability factor, annual forced outage hours per user and power transmission and distribution loss rates of other project target areas have all improved and users' satisfaction level is also generally high. Thus, it is judged that project effects have sufficiently generated. In addition, impacts of the project contributing to investment promotion and improved standard of living in project surrounding areas have also seen. Thus, its effectiveness and impact are high. No negative impact on natural environment has been reported, and land acquisition process has taken place appropriately based on the relevant regulations in Vietnam; thus, no problem has been seen. No major problem has been observed in the institutional, technical and financial aspects of operation and maintenance as well as in the current status. In addition, maintenance situation of transmission and substation facilities as well as distribution facilities is also good and the facilities are operating smoothly. Therefore, sustainability of the project effects is high.

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

1. Project Description

Project Locations

Building of a substation constructed in this project (Yen My Substation, Hung Yen province)

1.1. Background

As a result of the high rate of economic growth in Vietnam, the demand for electric power was rapidly increasing, and the *Sixth Power Development Master Plan (2006-2015)* approved in July 2007 pointed out that power demand would increase at an annual average of about 17.0% towards 2015. In the Master Plan, 13,720 MW of new power supply development was planned between 2007 and 2010 in order to respond to the urgent issue of power demand increase. In addition, the Master Plan pointed out that construction and expansion of the power transmission and distribution network needed to be advanced in tandem with the development of power sources, and that a reduction of loss in power transmission and distribution should also be pursued. It pointed out that providing efficient and stable power supply was essential by developing transmission and substation equipment and distribution network. As for electrification, the electrification rate was approximately 90% on a household level at the end of 2005, and it was achieved almost nationwide, but overloading facilities due to increasing power demands was a problem especially in urban areas. For this reason, many facilities were operating in excess of their normal utilization rate, which made it difficult to deliver stable power. The World Bank, which had been supporting mainly in rural electrification, gradually shifted its focus to power development support, and the Asian Development Bank also had a policy to strengthen support for power generation and high-voltage system divisions. Through this project, it was expected that efficient and stable power supply to meet the rapidly increasing power demand to be secured as well as reduction of transmission and distribution loss contributing to reduction of fuel consumption of power plants to be advanced, while major donors shifted their focus to power development.

1.2 Project Outline

The objective of this project is to ensure a stable power supply to meet the rapidly growing power demand and to reduce loss in power transmission and distribution by constructing and strengthening power transmission and substation facilities as well as improving distribution lines in industrial zones and the surrounding areas of Vietnam's principal urban areas, thereby contributing to the economic growth and the improvement of living standards in the region.

Loan Approved Amount/ Disbursed Amount	10,906 million yen / 10,648 million yen	
Exchange of Notes Date/ Loan Agreement Signing Date	March, 2008 / March, 2008	
Terms and Conditions	Interest Rate Repayment Period (Grace Period Conditions for Procurement	1.2% 30 years 10 years) General Untied
Borrower / Executing Agencies	The Government of the Socialist Republic of Viet Nam / Northern Power Corporation, Hanoi Power Corporation, Hai Duong Power Corporation, Hai Phong Power Corporation, Da Nang Power Corporation, Ho Chi Minh City Power Corporation, Dong Nai Power Corporation	
Project Completion	December, 2015	
Main Contractor (Over 1 billion yen)	-	
Main Consultant (Over 100 million yen)	-	
Related Studies (Feasibility Studies, etc.)	-	
Related Projects	・Technical Cooperation - The study on National Power Development Plan (2005 – 2006) ・Japanese ODA Loan - Phu My Thermal Power Plant Project	

	(1)(2)(3)(4) (January, 1994, April, 1995, March, 1997, March 1999) - Pha Lai Thermal Power Plant Project (1)(2)(3)(4) (April, 1995, March, 1996, March, 1997, March, 1999)

2. Outline of the Evaluation Study

2.1 External Evaluator

Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

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

Duration of the Study: August, 2017 – September, 2018

Duration of the Field Study: October 29 – November 25, 2017, December 3 – December 23, 2017, March 18 – April 16, 2018

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

3.1 Relevance (Rating: ③[2])

3.1.1 Consistency with the Development Plan of Vietnam

At the time of appraisal, the Government of Vietnam set the foundation for industrialization until 2020 as its primary goal in the *Socio-Economic Development 10-Year Strategy* (hereinafter referred to as "SEDS") (2001-2010), emphasized in ensuring stable supply of electric power through the development of power supply, transmission and distribution in the *Eighth Social Economic Development Five-Year Plan* (hereinafter referred to as "SEDP") (2006-2010). Also, in the *Sixth Power Development Master Plan* (2006-2015), it is pointed out the necessity of power supply development, construction and expansion of transmission and distribution networks, reduction of transmission and distribution losses. The importance of efficient and stable supply of electricity was raised by improving transmission and transformation equipment and distribution network

At the time of ex-post evaluation, "infrastructure construction" has been proposed as one of the pillars to realize industrialization until 2020 in SEDS (2011-2020) and SEDP (2016-2020), and thus it has been required to accelerate the infrastructure development even. Furthermore, with the ever-increasing demand for electricity, the Vietnamese Government emphasizes securing electricity supply necessary for development by rapidly developing electricity supply sources while introducing energy-saving

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

[2] ③:High, ②:Fair, ①:Low

technology. Also, in the *Seventh Power Development Master Plan* (2011-2020), the Vietnamese Government declares to increase the capacity of power generation facilities and aims to achieve stable power supply through the new establishment and expansion of power transmission and distribution equipment. In addition, the Government shows to strengthen the backup function of transmission and distribution network to improve distribution facilities with high reliability and quality, and it is required at the time of ex-post evaluation to secure stable electric power supply and reduce transmission and distribution loss.

3.1.2 Consistency with the Development Needs of Vietnam

Electricity demand in Vietnam highly increased with high economic growth at the time of appraisal, but power supply facilities capable of responding to the demand were not in place and the power supply was insufficient. Also, the lower transmission and distribution network was not developed and it was operated with an overload, resulting in transmission and distribution loss. Especially in the industrial zones in the major urban areas and the surrounding areas, many facilities were operated beyond the usual operating rate, and the stabilization of power supply was a problem. As electricity demand in Vietnam rapidly rose, it took time to construct power generation facilities, so it was an urgent task to reduce power plant fuel consumption and to reduce transmission and distribution losses. This project aims to secure stable electric power supply corresponding to the rapidly increasing electric power demand and to reduce transmission and distribution losses by newly establishing and strengthening the transmission facilities in major cities of Vietnam, which is consistent with the development needs.

Even at the time of ex-post evaluation, the electric power demand in the area under the authority of the executing agency, the power corporation, has been increasing year by year, and securing stable and reliable power supply continues to be an important issue. For example, Table 1 shows the trends in power sales in Nghe An Province, Hung Yen Province, and Ha Nam Province under the jurisdiction of Northern Power Corporation. The annual average rate of increase in 2011 to 2017 is extremely high as Nghe An Province: 14.2%, Hung Yen Province: 17.3%, Ha Nam Province: 22.1%, which requires to continue to construct and strengthen transmission and distribution facilities, and to prevent overload operation in order to ensure efficient and stable power supply. Along with further economic growth in Vietnam, the importance of this project remains unchanged at the time of ex-post evaluation.

Table 1: Trend of Power Sales in Nghe An Province, Hung Yen Province, Ha Nam Province

(Unit: million kWh)

	2011	2012	2013	2014	2015	2016	2017 (Estimation)
Nghe An Province							
Power Sales	1,204.69	1,372.40	1,498.36	1,701.32	1,918.30	2,382.15	2,771.09
Growth Rate (%)	9.3%	13.9%	9.2%	13.5%	12.8%	24.2%	16.3%
Hung Yen Province							
Power Sales	1,290.04	1,512.04	1,975.97	2,305.67	2,740.88	3,109.36	3,477.55
Growth Rate (%)	12.4%	17.2%	30.7%	16.7%	18.9%	13.4%	11.8%
Ha Nam Province							
Power Sales	652.40	755.03	886.84	1,011.56	1,239.52	2,093.79	2,347.14
Growth Rate (%)	3.9%	15.7%	17.5%	14.1%	22.5%	68.9%	12.1%

Source: Results from questionnaire survey of executing agency (Northern Power Corporation)

3.1.3 Consistency with Japan's ODA Policy

The *Country Assistance Program for Vietnam (April 2004)* positioned growth promotion as a priority field, and indicated a policy for the active support to develop economic infrastructure including electric power as well as for the engagement in the power transmission and distribution business to promote private investment and improve efficiency. This project is consistent with the above policy in a way that aims at stable supply of power and reduction of transmission and distribution loss by newly installing and enhancing transmission facilities as well as establishing distribution line.

Also, the *Medium-Term Strategy for Overseas Economic Cooperation Operations (FY2005-FY2007)* positioned the "infrastructure development for sustainable economic growth" as an important field of assistance to Vietnam and indicated a policy to support economic and social infrastructure development such as energy as a pillar. Furthermore, the *Country Assistance Strategy (April 2004)* looked for the importance to provide support for power generation, stable and efficient supply of electric power and support of power distribution system that contributes to rural electrification to rectify disparities between cities and rural areas. This project is consistent with the above policies.

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

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

All the outputs developed in the subprojects of this project fall under the project scope of the initial plan as below.

- Construction and reinforcement of 110 kV power transmission lines
- Construction and expansion of 110 kV substations
- Expansion and rehabilitation of distribution line network

On the other hand, the number of subprojects that have been developed has increased substantially from the initial plan (25 subprojects) to 63 (2.52 times). This is because project cost was reduced as a result of competitive bidding – bid price fell below the planned price – and because unused ODA loan balance has occurred due to depreciation of local currency Vietnam Dong against Japanese yen. Therefore, each executing agency made use of this and implemented additional subprojects. Further, the allocated amount under the Contingency category of the Loan was utilized to maximize the use of the Loan. Table 2 shows the comparison of planned and actual number of subprojects in this project.

Table 2: Comparison of Planned and Actual Number of Subprojects

Executing Agencies	Number of Subprojects		
	Plan	Actual	Comparison
Northern Power Corporation	2	4	+2
Hanoi Power Corporation	2	12	+10
Hai Duong Power Corporation	4	9	+5
Hai Phong Power Corporation	2	10	+8
Da Nang Power Corporation	2	9	+7
Ho Chi Minh City Power Corporation	9	13	+4
Dong Nai Power Corporation	4	6	+2
Total	25	63	+38

Source: Results from questionnaire survey of each executing agency

All the additional subprojects are consistent with the project purpose as well as with high importance and urgency, meeting JICA requirements[3]. Thus, they are deemed

[3] According to Ho Chi Minh City Power Corporation, for example, following 12 requirements were necessary to be fulfilled in order for subprojects to be added. (Source: Document submitted by the executing agency)
(1) The subprojects should be listed in the Power Network Development Plan of Ho Chi Minh City.
(2) Subprojects shall supply power to Districts of Ho Chi Minh City where multiple industrial zones are located.
(3) Subprojects shall not be financed by external financial sources other than JICA.
(4) The eligible portion for the contract to be financed by JICA has not been nor will not be financed by any

appropriate, commensurate with inputs.

This project is a sector loan project with following features: ① not all the planned number of individual subprojects are grasped in advance before the loan approval (modification and changes of project scope are likely to occur) and ② the project targets multiple subprojects, and the target subprojects are decided during project implementation. The increase in the number of subprojects can be said to be the result of successful utilization of the features of sector loan.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost was initially planned to be 12,685 million yen (out of which 10,906 million yen was to be covered by Japanese ODA loan). In actuality, the total project cost was 13,576 million yen (out of which 10,648 million yen was covered by Japanese ODA loan), which is higher than planned (107% of the planned amount). This is due to an increase in Vietnamese government expenditure portion (locally funded portion) as a result of additional implementation of subprojects utilizing the unused ODA loan balance. In other words, despite reduction of project cost as a result of competitive bidding as well as incidence of exchange rate fluctuation (yen appreciation, Dong depreciation), it is considered that the project cost increased beyond this reduction due to implementation of additional subprojects.

3.2.2.2 Project Period

Regarding project period, comparison of planned and actual project period was made also applying the rate of increase of outputs (2.52 times) to the planned project period in consideration of the fact that the number of subprojects implemented has increased substantially, and many additional subprojects (33 out of 38 additional subprojects) started after March 2011, which is after the construction period of the original plan. As a result, planned project period became 93 months, 2.52 times the

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other financial sources including EVN.
(5) The contract amount for all contracts of the projects to be financed by JICA shall be less than 1 billion Japanese yen
(6) Procurement of contractors shall be basically Local Competitive Bidding to ensure prompt implementation. In the cases where International Competitive Bidding is applied, “Guidelines for Procurement under Japanese ODA Loans” (1999 edition) shall be followed.
(7) The implementation periods of the subprojects shall be no more than five years.
(8) Subprojects shall not require resettlement.
(9) Subprojects shall not be located in “sensitive areas” indicated in the JBIC Guidelines for Confirmation of Environmental and Social Considerations.
(10) Subprojects shall be in compliance with related laws and regulations of Vietnam.
(11) Any subprojects whose result of bidding evaluation of contractor had completed prior to the date of Pledge by the government of Japan shall be excluded.
(12) In case the total costs exceed the loan allocated amount under Ho Chi Minh City Power Corporation, the shortage amount shall be funded by Ho Chi Minh City Power Corporation.

original project period of 37 months, from March 2008 (conclusion of Loan Agreement) to March, 2011 (completion of construction). On the other hand, the actual project period was seven years and ten months (94 months) from March, 2008 (conclusion of Loan Agreement) to December, 2015 (completion of actual construction), which is longer than planned (101% of the plan). Main reason for the delay is due to extension of construction period as a result of addition of subprojects. When looking at the implementation status of individual subprojects, reasons for their delay can be attributed to the delay in land acquisition (cumbersome coordination and procedures with local governments took time and consensus process on compensation amount with project affected residents took time). However, overall, because the effect of extension of construction period due to increase in the number of subprojects was significant, delay due to land acquisition was absorbed by this.

Table 3: Comparison of Planned and Actual Project Period

Plan (At Project Appraisal)	Plan Considering the Rate of Increase of Outputs	Actual (At Ex-post Evaluation)	Comparison of Planned and Actual Period Considering the Rate of Increase of Outputs
Mar. 2008 – Mar. 2011 (37 months)	37×2.52= 93 months	Mar. 2008 – Dec. 2015 (94 months)	94/93=101%

Source: Information provided by JICA, and results from questionnaire survey of executing agency

3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

Because subprojects are small in scale and numerous, and because they were not identified at the time of appraisal, it was difficult to calculate the internal rate of return. Consequently, it was not calculated. For this reason, recalculation was not conducted in this study.

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

BOX1: Role of Vietnam Electricity (hereinafter referred to as "EVN") in this Project

In this project, subprojects were implemented independently by seven Power Corporations[4] (the executing agencies), which are subsidiaries of EVN. (See Figure 1 below for the organization chart showing the relationship between EVN and each Power Corporation.) Among the seven Power Corporations, six Power Corporations, except for Northern Power Corporation, had no experience of becoming an executing agency for ODA loan projects. Therefore, EVN was to supervise and coordinate with them for smooth project implementation. The role of EVN in the project implementation is summarized below.

- Guidance and coordination utilizing the existing institution and systems within the EVN group

In respect to guidance and coordination etc. by EVN regarding project implementation, institution and systems within the EVN group have already been developed and established, and projects supported by donors including JICA were also carried out utilizing this existing system. In other words, special systems have not been developed regarding implementation of donor supported projects, including operation and maintenance after project completion, but donor supported projects were carried out by effectively utilizing the existing systems within the EVN group. For example, when executing agencies added subprojects by utilizing unused ODA loan balance, each executing agency contacted and informed EVN about this in advance and then submitted request letters to JICA. After concurrence letter was issued from JICA, each executing agency reported again to EVN, and based on that, EVN sent official letters concerning commencement of procedures for implementing additional projects as well as management of accounts/disbursement of funds to The Vietnam Development Bank, which is responsible for fund management of executing agencies for this project. Such series of communication and coordination process was carried out utilizing the existing systems within the EVN group. In addition, each executing agency reports to EVN quarterly regarding progress of implementation of subprojects and fund expenditure status during project implementation. This is not limited to this project – the same communication and reporting systems have been taken place for other donor supported projects as well as EVN own-funded projects.

[4] Seven Power Corporations are: Northern Power Corporation, Hanoi Power Corporation, Hai Duong Power Corporation, Hai Phong Power Corporation, Da Nang Power Corporation, Ho Chi Minh City Power Corporation, and Dong Nai Power Corporation

- Training with the arrangement of EVN

A training program on the implementation of this project was carried out in July 2008 for seven executing agencies and The Ministry of Finance of Vietnam with the arrangement of EVN. Instructors were representatives and national staffs of JBIC Office at the time, and lectures were held on procurement supervision, opening of accounts, disbursement of funds, issues to be noted on project implementation, and so on regarding this project. According to the interviews with the executing agencies, they have pointed out that the training was very useful to them for project implementation.

- Preparation of instructions/guidelines by EVN on the implementation of JICA projects

Based on the experience of this project, EVN has prepared and distributed instructions/guidelines for each executing agency for successive on-going JICA project at the time of ex-post evaluation (i.e., Second Power Transmission and Distribution Network Development Project) and they are utilized by the executing agencies. Not only for JICA projects, such instructions/guidelines are prepared by EVN for each on-going project supported by other donors such as the World Bank and the Asian Development Bank, and are shared with relevant organizations. Following issues are covered in the instructions/guidelines of the subsequent project.

- Criteria for selecting subprojects[5]
- Coordination process within EVN and among related organizations
- Responsibilities and roles of each related organization
- Organization/institutional structure related to project implementation
- Financial management (regarding financial management report) etc.

Such initiative carried out by EVN is extremely helpful in facilitating project implementation and it can be noted as a good practice case.

[5] Following contents are listed as the main selection criteria.
- Subprojects shall be consistent with the project purpose (i.e., to ensure a stable power supply to meet the rapidly growing power demand and to stabilize economic activities by constructing and strengthening power transmission and substation facilities as well as improving distribution lines in industrial zones, its surrounding area and major cities of Vietnam).
- Necessity, importance, urgency, feasibility, etc., are confirmed in the feasibility study. (Each power corporation has prepared a priority list of transmission and substation facilities and distribution lines that need to be improved and strengthened from the viewpoint of securing stable power supply and improving reliability, and are reviewing the list based on the situation of power demand etc. Thus, subprojects shall be included in the priority list.)
- Subprojects shall be directly and indirectly beneficial to Japanese companies. (Subprojects shall supply power to industrial zones where many Japanese companies are located or supplies power to Japanese companies.)

3.3 Effectiveness and Impacts[6] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Regarding operation and effect indicators of the project, project on strengthening of transmission and substation facilities in Yen My District, Hung Yen Province was selected as a pilot region at the time of appraisal. Table 4 shows the actual figures of operation and effect indicators of the subproject on strengthening of power transmission and substation facilities in the same District (110 kV Yen My Substation) under the jurisdiction of Northern Power Corporation.

Table 4: Operation and Effect Indicators in Pilot Area (Yen My District, Hung Yen Province)

	Baseline	Target	Actual			
	2006	2012	2014	2015	2016	2017 (Estimation)
		2 Years After Completion of the Project	2 Years After Completion of this Subproject	3 Years After Completion of this Subproject	4 Years After Completion of this Subproject	5 Years After Completion of this Subproject
			—	Completion Year of the Project	1 Year After Completion of the Project	2 Years After Completion of the Project
Availability factor (%) (Availability factor of transformer at 110 kV substation: annual maximum load / transformer capacity)	89.4	81.0	76.4	88.6	106.4	102.9
Annual forced outage time per user due to accident (minutes/year-user)	521	416	N.A.	N.A.	N.A.	N.A.

Source: Results from questionnaire survey of executing agency (Northern Power Corporation)

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

Note 1) Availability factor is the ratio of the maximum load to the maximum output of the facility. It is desirable to keep the figure to about 80% at the maximum so that power can be stably supplied even in unforeseen circumstances.

Note 2) In regard to annual forced outage time per user due to accident, according to the executing agency, the actual figure is unknown since there is no data only for this subproject.

Availability factor was 76.4% in 2014, two years after completion of this subproject, achieving the target set at the time of appraisal (81.0%). However, the figure was 102.9% in 2017, two years after completion of this entire project – ratio of maximum load to maximum output of facilities exceeded the target. This indicates that there is need for further improvement in the same area since development of substation facilities has not kept up with the rapidly increasing power demand. According to the executing agency, with respect to Yen My District covered by this subproject, development of Yen My industrial cluster was decided after planning this subproject, which led to rapid increase in power demand in this district. Furthermore, due to the rapid increase in power demand in the industrial zones around the area (Pho Noi Industrial Zone and Thang Long Industrial Zone No.2), Yen My Substation, controlled by dispatchers, also supplies power to these industrial zones in the surrounding areas. It is said that such factors also contributed to the increase of availability factor of the substation. According to the executing agency, the above-mentioned rapid increase in power demand due to industrial cluster development etc. was not predictable at the time of appraisal in 2007.

Yen My Substation (Hung Yen Province)

As regards annual forced outage time per user due to accident, it was not possible to compare with the target figure at the time of appraisal since there was no data only for this subproject. However, the actual figures of entire Hung Yen Province are shown in Table 5 for reference, which has decreased sharply. (The data of the entire Hung Yen Province was not measured in 2006.)

Table 5: Actual Figures of Annual Forced Outage Time per User Due to Accident (minutes/year-user) in Hung Yen Province

	Actual			
	2014	2015	2016	2017 (Estimation)
Annual forced outage time per user due to accident (minutes/year-user)	3,262	2,103	1,338	746

Source: Results from questionnaire survey of executing agency (Northern Power Corporation)

For reference, availability factor of the substation of other subproject (110 kV Khoai Chau substation) implemented by the Northern Power Corporation in the same Hung Yen Province (Table 6) was 60.2% in 2014, whereas 2017 forecast increased drastically to 98.6% (growth rate: approximately 64%), for which vigorous power demand of the Province can be inferred.

Table 6: Actual Figures of Availability Factor of Other Subproject in Hung Yen Province

	Actual			
	2014	2015	2016	2017 (Estimation)
Availability factor (%) (Availability factor of transformer at 110 kV substation: annual maximum load / transformer capacity)	60.2	93.4	94.0	98.6

Source: Results from questionnaire survey of executing agency (Northern Power Corporation)

Furthermore, when looking at the trend of power sales in Hung Yen Province (Table 1 aforementioned), the annual average growth rate between 2011 and 2017 is 17.3%, which is a very high growth rate. Thus, it can be considered that development of substation facilities is an urgent matter in the face of rapidly increasing power demand. If this project was not implemented, the actual figure of availability factor would have been even higher.

In addition, when looking at the actual figures (Table 7) of other power corporations (Hanoi Power Corporation, Da Nang Power Corporation, Ho Chi Minh City Power Corporation) in each jurisdiction over the years obtained as reference information, both availability factor and annual forced outage time per user due to accident are decreasing, and it can be considered that this project has contributed to this.

Table 7: Actual Figures under the Jurisdiction of Other Power Corporations

	Actual			
	2014	2015	2016	2017 (Estimation)
Jurisdiction of Hanoi Power Corporation				
Availability factor (%) (Availability factor of transformer at 110 kV substation: annual maximum load / transformer capacity)	86	76	79	82
Annual forced outage time per user due to accident (minutes/year-user)	2,026	1,360	965	741
Jurisdiction of Da Nang Power Corporation				
Availability factor (%) (Availability factor of transformer at 110 kV substation: annual maximum load / transformer capacity)	67.4	70.5	63.0	59.6
Annual forced outage time per user due to accident (minutes/year-user)	1,829	1,093	920	860
Jurisdiction of Ho Chi Minh City Power Corporation				
Availability factor (%) (Availability factor of transformer at 110 kV substation: annual maximum load / transformer capacity)	95	95	85	75
Annual forced outage time per user due to accident (minutes/year-user)	1,285	720	514	245

Source: Results from questionnaire survey of each executing agency

In addition, transmission and distribution loss rates[7] (Table 8) are also decreasing in the jurisdiction of each executing agency, and it can be considered that this project

[7] Loss rates of power when transmitting power from power plants to users (customers) through transmission lines/distribution lines.

is contributing to the reduction of loss rates.

Table 8: Actual Figures of Transmission and Distribution Loss Rates under the Jurisdiction of Each Power Corporation

	Actual			
	2014	2015	2016	2017 (Estimation)
Jurisdiction of Northern Power Corporation	7.39	6.68	6.09	5.78
Jurisdiction of Hanoi Power Corporation	5.83	5.71	5.22	4.97
Jurisdiction of Da Nang Power Corporation	3.76	3.59	3.22	3.22
Jurisdiction of Ho Chi Minh City Power Corporation	5.08	4.66	4.16	4.11

Source: Results from questionnaire survey of each executing agency

3.3.1.2 Qualitative Effects (Other Effects)

Regarding qualitative effects of this project, realization of stable power supply, meeting the power demand in the project target areas (the areas where the subprojects are implemented) was anticipated. In order to verify this assumption, interview survey was carried out with beneficiaries surrounding the subprojects[8] where site survey was conducted (management offices of industrial zones, companies in industrial zones (all were Japanese companies), commercial facilities, local residents, total of 11 interview cases for 20 beneficiaries).

As a result, all the interviewees have indicated that there is no particular significant problem concerning power supply at the time of ex-post evaluation, and that stable power supply has realized. A management office of an industrial zone mentioned that, prior to the project, power was supplied from the existing substation, and voltage drops of 20 to 30% occurred frequently and power supply was unstable.

[8] Following are the subprojects where site survey and interviews were conducted.
- Yen My Substation (Hung Yen Province)
- Chau Son Substation and Transmission Line (Ha Nam Province)
- Quang Minh Substation (Hanoi City)
- Dong Anh-Chem Transmission Line (Hanoi City)
- Phuc Dien Substation (Hai Duong Province)
- Ben Rung-Bac Song Cam Transmission Line (Hai Phong City)
- Hoa Khanh 2 Substation (Da Nang City)
- Distribution Lines in Lien Chieu Area (Da Nang City)
- Binh Tri Dong Substation and installation of the second transformer (Ho Chi Minh City)
- An Phuoc Substation and installation of the second transformer (Dong Nai Province)

However, after the project, power is supplied from the new substation – power supply is stable without problem, and power demand of tenant companies is also increasing due to expansion of production lines of factories in the industrial zone. A management office of another industrial zone said that after the project implementation, it is now possible to receive power supply at high pressure and there is no problem regarding quality of power. A Japanese company (manufacturing industry), mentioned that although there are instantaneous blackouts or instantaneous voltage drops several times a month after the project, they do not affect their production line, and that they are generally satisfied with the supply of power. A commercial facility pointed out that prior to the project, power supply from the existing substation was unstable (there were also incidence of power outages for about 20 to 25 minutes, including planned blackouts), however, distribution network was reinforced and power supply is stable with supply from the new substation as a result of this project. Local residents mentioned that before the project there were power outages once a week (there were various time periods of blackouts, including planned blackouts, half a day, three to four hours, one hour etc.), however, power supply is stable and there is no problem after the project.

Based on the above, it can be considered that this project is contributing to securing stable power supply and improving reliability, based on comprehensive judgment from the analysis of quantitative effects as well as the results of interviews with end users around the subprojects.

Chau Son Substation (Ha Nam Province)

Quang Minh Substation (Hanoi City)

Dong Anh-Chem Transmission Line (Hanoi City)

Phuc Dien Substation (Hai Duong Province)

Ben Rung-Bac Song Cam Transmission Line (Hai Phong City)

Hoa Khanh 2 Substation (Da Nang City)

Binh Tri Dong Substation (Ho Chi Minh City)

An Phuoc Substation (Dong Nai Province)

3.3.2 Impacts

3.3.2.1 Intended Impacts

As impacts of this project, promotion of investment in project target areas and

improvement of living standard were assumed. Since such macro changes are affected by factors other than this project, it is difficult to verify direct causal relationship, however, in order to confirm the assumed impacts at the time of appraisal, analysis was made on the trend of power sales and industrial production data in the target area.

Among the executing agencies of this project, the trend of power sales by Hanoi Power Corporation covering Hanoi Capital Region and by Ho Chi Minh City Power Corporation covering Ho Chi Minh City, which is the largest city in the south, are shown in Tables 9 and 10, respectively.

In the five years from 2013 to 2017, the growth rates of power sales (total) in Hanoi City and Ho Chi Minh City are about 45% and about 30% respectively. During the same period, power sale in Hanoi City has increased by about 44% and in Ho Chi Minh City by about 26%, respectively for industrial sector, and power sale in Hanoi City has increased by about 62% and in Ho Chi Minh City by about 40%, respectively for commercial sector – all showing substantial increase. Also for residential sector during the same period, power sale in Hanoi City has increased by about 41% and in Ho Chi Minh City by about 29%, respectively, which is significant increase and it can be considered that consumption per household has increased[9].

Table 9: Trend of Power Sales under the Jurisdiction of Hanoi Power Corporation

(Unit: billion kWh)

	2013	2014	2015	2016 年	2017 (Estimation)	Growth Rate between 2013-2017
Agriculture	0.08	0.07	0.09	0.11	0.16	94.3%
Industrial	3.53	3.84	4.28	4.73	5.10	44.4%
Commercial	0.79	0.89	1.07	1.22	1.28	62.4%
Residential	6.22	7.03	7.83	8.43	8.80	41.4%
Others	0.65	0.72	0.86	0.94	1.00	53.3%
Total	11.28	12.56	14.14	15.45	16.35	44.9%
Growth Rate of Total	6.6%	11.3%	12.5%	9.3%	5.8%	-

Source: Results from questionnaire survey of executing agency (Hanoi Power Corporation)

Note 1) Inconsistency of figures exists due to rounding error.

Note 2) Since growth rate in each sector from 2013 to 2017 is calculated based on detailed numerical values

[9] (Reference) While the growth rate of population in Hanoi City is about 5.0% and that in Ho Chi Minh City is about 6.1% between 2013 to 2016 (source: General Statistics Office (GSO) Statistical Yearbook of Vietnam 2016), growth rates of power sales to residential sector during the same period are about 36% in Hanoi City and about 24% in Ho Chi Minh City, which are significantly higher than population growth rates.

(before rounding off), it does not coincide with the growth rate calculated from the rounded off power sales in this table.

Table 10: Trend of Power Sales under the Jurisdiction of Ho Chi Minh City Power Corporation

(Unit: billion kWh)

	2013	2014	2015	2016	2017 (Estimation)	Growth Rate between 2013-2017
Agriculture, Forestry and Fishing	0.05	0.06	0.07	0.07	0.08	60.0%
Industry, Construction	7.19	7.56	8.09	8.70	9.03	25.6%
Commercial, Service	2.25	2.38	2.62	2.94	3.17	40.9%
Residential	7.07	7.45	8.13	8.80	9.14	29.3%
Others	1.09	1.16	1.27	1.37	1.47	34.9%
Total	17.65	18.61	20.18	21.89	22.89	29.7%
Growth Rate of Total	5.5%	5.4%	8.5%	8.5%	4.6%	-

Source: Results from questionnaire survey of executing agency (Ho Chi Minh City Power Corporation)

Note 1) Inconsistency of figures exists due to rounding error.

Table 11 shows the trend of industrial production of project target areas (cities and provinces). All the cities and provinces have been on the rise from the previous year.

Table 11: Trend of Industrial Production in Project Areas (Each City and Province)

(Unit: %)

Province, City	2012	2013	2014	2015	2016
Hanoi City	105.0	104.5	104.2	108.3	107.3
Nghe An Province	109.7	106.0	110.0	109.0	109.4
Hung Yen Province	108.9	107.2	107.5	108.7	108.5
Ha Nam Province	130.7	110.9	111.9	124.8	111.1
Hai Duong Province	99.0	108.1	114.6	110.6	108.8
Hai Phong City	103.9	106.5	112.9	116.6	116.9
Da Nang City	106.0	110.5	111.0	113.1	113.2
Ho Chi Minh City	105.0	106.3	106.8	107.2	107.3
Dong Nai Province	107.4	107.6	107.6	107.7	107.5

Source: General Statistics Office (GSO) Statistical Yearbook of Vietnam 2016

Note 1) Base year is 2010. The figures in each year are the percentage when regarding the previous year as 100%.

From the above, it can be considered that this project has been contributing to the activation of economic activities, improvement of investment environment and promotion of investment, as well as improvement of living standards in the northern metropolitan area, central and southern economic cities.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Natural Environment

In this project, there was no large-scale deforestation in any of the subprojects, nor subproject whose project site was located in national parks or in protected areas designated by the country. Therefore, Category A subprojects were not implemented. In other words, this project does not fall under large-scale sectors, characteristics, and regions that are likely to affect environment, and thus undesirable effects on environment are not serious.

According to the executing agencies, they could not identify any negative impacts on natural environment during and after the project, and there were no complaints from surrounding industrial zones and residents. In addition, answers to the interview survey from end users around the subprojects also indicate that there was no particular incident regarding air pollution, odor, vibration, noise, etc. during and after the project. Therefore, it can be regarded that there is no negative impact on natural environment.

2) Resettlement and Land Acquisition

Table 12 summarizes the comparison of planned and actual state of resettlement and land acquisition for each executing agency.

Table 12: Comparison of Planned and Actual Resettlement and Land Acquisition

Executing Agencies	Plan		Actual	
	Land	Resettlement	Land	Resettlement
Northern Power Corporation	5.2ha	0	5.2ha	0
Hanoi Power Corporation	12.0ha	0	12.0ha	0
Hai Duong Power Corporation	3.6ha	0	3.3ha	0
Hai Phong Power Corporation	1.3ha	0	1.3ha	0
Da Nang Power Corporation	0	0	0	0
Ho Chi Minh City Power Corporation	7.8ha	0	8.6ha	0
Dong Nai Power Corporation	0.7ha	0	0.7ha	0

Source: Results from questionnaire survey of each executing agency

Resettlement did not take place in any of the subprojects. Area of land acquisition increased somewhat from the initial estimation for Ho Chi Minh City Power Corporation, but other than this were as planned or slightly decreased. The reason for increase/decrease is due to the establishment of specific transmission line route after the start of the project.

According to the executing agencies, compensation procedures for landowners who provided a part of the land for this project were carried out based on government regulations on compensation[10]. There were cases in which it took time for consensus process on compensation amount to the targeted residents. According to the executing agencies, these residents finally agreed after carefully and patiently explaining the purpose and significance of the project. However, an agreement on the amount of compensation with the target resident could not be reached for one subproject under Ho Chi Minh City Power Corporation and the subproject was canceled after all. In addition, other than reaching agreement on the compensation amount, there were cases where it took time to coordinate and secure the site necessary for construction of transmission lines and substations (complicated

[10] Articles 21 and 22 of Decree No. 69/2009/ND-CP.

negotiation and procedures) with local governments.

Land acquisition process including consultation with residents, was properly implemented based on Vietnamese regulations, without any problem.

This project has largely achieved its objectives. Therefore, effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ③)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

Operation and maintenance work of the subprojects after completion is carried out by the operation and maintenance organizations established under each power corporation, and there is no particular institutional change from the plan at the time of appraisal. (Table 13, Figure 1)

Table 13: Operation and Maintenance System of Subprojects Developed in This Project

Executing Agency	Structure of Operation and Maintenance
Northern Power Corporation	Northern High Voltage Grid Company under Northern Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines. Under this Company, Northern Grid Branches are established at each provincial level (Hung Yen, Nghe An, and Ha Nam), and are carrying out operation and maintenance work on site.
Hanoi Power Corporation	Hanoi Power High Voltage Grid Company under Hanoi Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines.
Hai Duong Power Corporation	High Voltage Power Network Enterprise under Hai Duong Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines. District Power under Hai Duong Power Corporation is responsible for operation and maintenance of distribution network of 35 kV or less.
Hai Phong Power Corporation	High Voltage Management Enterprise under Hai Phong Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines. District Power under Hai Phong Power Corporation is responsible for operation and maintenance of distribution network of 35 kV or less.
Da Nang Power Corporation	110 kV Grid Management Division in Da Nang Power Corporation is in charge of operation and maintenance of 110

	kV substations and transmission lines. District Power under Da Nang Power Corporation is responsible for operation and maintenance of distribution network of 22 kV.
Ho Chi Minh City Power Corporation	Ho Chi Minh City High Voltage Grid Company under Ho Chi Minh City Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines.
Dong Nai Power Corporation	High Voltage Grid Enterprise under Dong Nai Power Corporation is in charge of operation and maintenance of 110 kV substations and transmission lines.

Source: Results from questionnaire survey of each executing agency

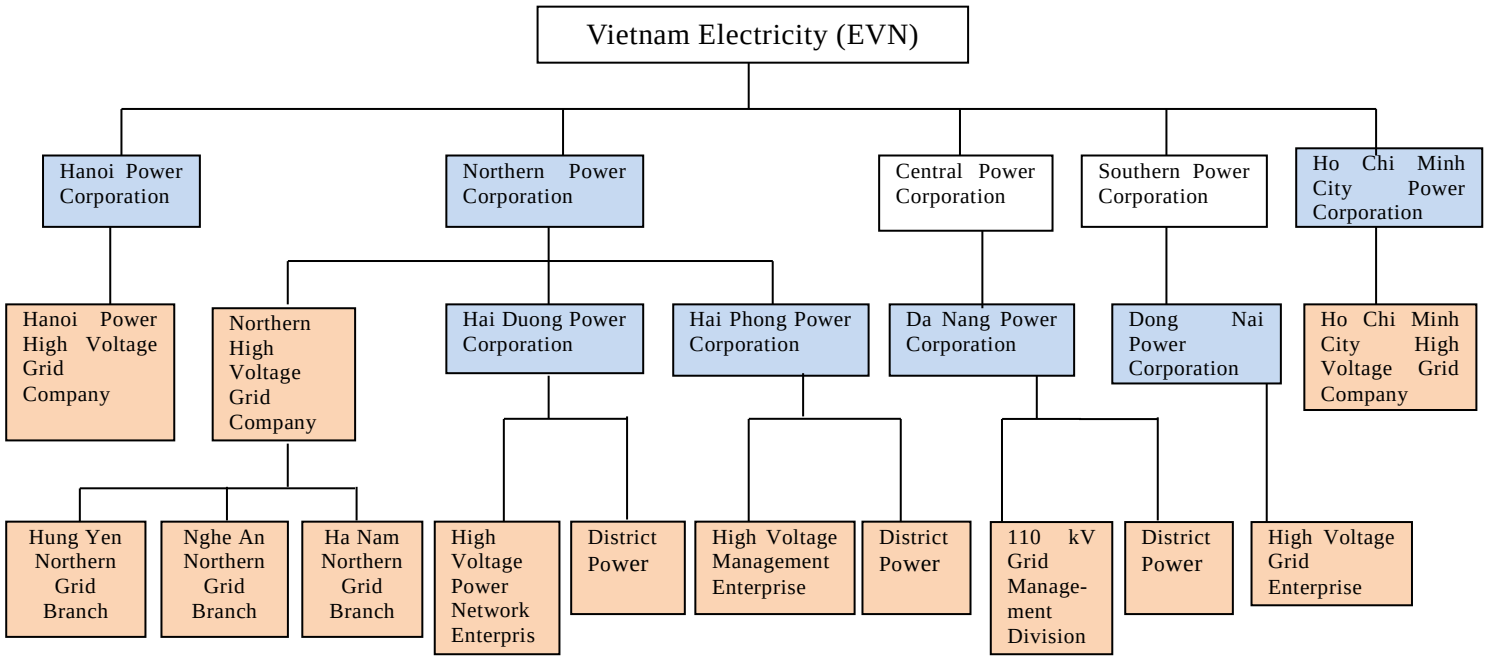


Figure 1: Operation and Maintenance System of Subprojects Developed in This Project

Source: Prepared by the evaluator based on interview and information provided by each executing agency

Note 1) Boxes shaded in light blue are the executing agencies. Boxes shaded in orange are the operation and maintenance organizations.

Role, division of work, coordination and decision making processes of each power corporation and operation and maintenance organizations under each power corporation are clear, and operation management of each subproject is standardized based on the "Organization of Activities Regulation" within the EVN group. According to each organization, it is difficult to clearly divide the number of staffs in charge of operation

and maintenance work for this project, since they are concurrently involved in operation and maintenance work of subprojects other than this project. However, it is said that the number of necessary staffs has been secured. Table 14 shows the number of staffs of the entire organization in charge of operation and maintenance of substations and transmission lines of 110 kV and above as well as the number of staffs responsible for operation and maintenance of subprojects for this project.

Table 14: Number of Staffs Engaged in Operation and Maintenance Work

Total Number of Staffs of Organizations in Charge of Operation and Maintenance of Substations and Transmission Lines Equal and Above 110kV	Of which, the Number of Operation and Maintenance Staffs of Subprojects for This Project
Northern High Voltage Grid Company under Northern Power Corporation: 2,437	36
Hanoi Power High Voltage Grid Company under Hanoi Power Corporation: 345	154
High Voltage Power Network Enterprise under Hai Duong Power Corporation: 426	N.A.
High Voltage Management Enterprise under Hai Phong Power Corporation: 303	218
110kV Grid Management Division in Da Nang Power Corporation: 47	8 (3 substations are already unmanned)
Ho Chi Minh City High Voltage Grid Company under Ho Chi Minh City Power Corporation: 511	N.A.
High Voltage Grid Enterprise under Dong Nai Power Corporation: 326	55

Source: Results from questionnaire survey of each executing agency

Remote monitoring technology for power network operation status using control and monitoring system of substations – Supervisory Control and Data Acquisition (hereinafter referred to as "SCADA") has been introduced, and based on the EVN policy, unmanned operation of each substation is proceeding. (Target year is 2020[11].) In the future, the number of staffs engaged in operation and maintenance of substations is expected to decrease. However, each operation and maintenance organization is gradually reducing the number of staffs and is reviewing the structure flexibly according to the situation. Therefore, no particular problem has been identified.

[11] Da Nang Power Corporation and Ho Chi Minh City Power Corporation have set goals ahead of schedule – substations to be unmanned by the end of 2018.

3.4.2 Technical Aspect of Operation and Maintenance

All the staffs in charge of operation and maintenance are graduates of master's degrees, bachelor's degrees or vocational schools etc. of engineering (electricity, machinery, physics etc.), and technical staffs who have accumulated sufficient technology and experiences concerning operation and maintenance work of subprojects developed in this project are deployed. According to each executing agency, the average number of years of technical staffs engaged in operation and maintenance work is 10 to 15 years, and four years at least. Also, in accordance with the duties assigned, staffs have acquired licenses of electrical management engineers certified by the Electricity Regulatory Authority of Vietnam under the Ministry of Industry and Trade or qualifications[12] accredited by Load Dispatch Center of each region.

In addition, based on the personnel training policy for the entire EVN group, on the job training (OJT) as well as training by the executing agencies and the operation and maintenance organizations under the executing agencies are carried out multiple times every year to all technical staffs in charge of operation and maintenance work. At each substation, contemporary technologies such as Gas Insulated Switchgear (GIS) and SCADA etc. are introduced, and the on-site technical staffs have acquired their operation methods etc. through OJT and training.

Operation and maintenance manuals are standardized within the EVN group, and they are revised from time to time as necessary, and are utilized for daily operation and maintenance work. In addition, manuals of machinery and equipment are prepared by the manufacturers at each substation, and are also reviewed, revised and utilized at each substation, according to situations and needs.

Therefore, no particular problem has been identified regarding the technical aspects of operation and maintenance.

3.4.3 Financial Aspect of Operation and Maintenance

The necessary operation and maintenance costs are estimated at each substation, and after compilation by the operation and maintenance organizations, budget request is made to the power corporation in charge and then the power corporation approves the budget. Budget is allocated as a part of operation and maintenance cost of the entire grid coverage, not for each individual subproject. According to interviews with each substation/maintenance organization and each executing agency, operation and maintenance costs are sufficiently secured at the level of each power corporation, and

[12] Certificate for Main Operator of 110 kV Substation and Certificate of Dispatcher.

the budget almost as requested has been allocated. Table 15 shows the budget, actual allocation and actual expenditure of operation and maintenance costs of each operation and maintenance organization.

Table 15: Operation and Maintenance Costs of Each Operation and Maintenance Organization

(Unit: million VND)

	2014	2015	2016	2017
Four Subprojects under Northern Power Corporation				
Budget (Requested Amount)	N.A.	1,138	N.A.	196
Actual Allocation	N.A.	1,141	N.A.	196
Actual Expenditure	N.A.	1,141	N.A.	196
Hanoi Power High Voltage Grid Company under Hanoi Power Corporation				
Planned Amount	13,049	13,049	13,049	13,049
Actual Allocation	12,909	13,849	15,059	15,327
Actual Expenditure	12,909	13,849	15,059	15,327
Nine Subprojects under Hai Duong Power Corporation				
Budget (Requested Amount)	N.A.	9,000	16,500	16,000
Actual Allocation	N.A.	9,000	16,500	16,000
Actual Expenditure	N.A.	8,900	16,500	16,000
High Voltage Power Network Enterprise under Hai Phong Power Corporation				
Budget (Requested Amount)	1,300	1,700	5,000	5,000
Actual Allocation	N.A.	N.A.	N.A.	N.A.
Actual Expenditure	1,240	1,660	4,864	4,900
110kV Grid Management Division in Da Nang Power Corporation				
Budget (Requested Amount)	36,731	41,414	46,361	48,582
Actual Allocation	36,731	41,414	46,361	48,582
Actual Expenditure	33,993	35,317	19,713	20,522
Ho Chi Minh City High Voltage Grid Company under Ho Chi Minh City Power Corporation				
Budget (Requested Amount)	51,887	108,375	79,910	98,916
Actual Allocation	50,730	106,676	72,163	93,366
Actual Expenditure	50,730	106,676	72,163	93,366
High Voltage Grid Enterprise under Dong Nai Power Corporation				
Budget (Requested Amount)	8,360	13,176	15,027	13,762
Actual Allocation	7,849	12,995	12,375	12,798
Actual Expenditure	7,849	12,995	12,375	12,798

Source: Results from questionnaire survey of each executing agency

Note 1) As regards four subprojects under Northern Power Corporation and nine subprojects under Hai Duong Power Corporation, since data on the total amount of respective subprojects was available, they were reflected in the table. Other than that, it was difficult to extract operation and maintenance costs of individual subprojects, therefore, operation and maintenance costs for each operation and maintenance organization as a whole were reflected in the table.

Note 2) According to Northern Power Corporation, relatively large scale repair was carried out in 2015 and a small scale repair was undertaken in 2017. Costs other than these repairs are not included in the table.

Note3) As regards Hanoi Power High Voltage Grid Company, available data of planned amounts were included in the table. According to Hanoi Power Corporation, planned amount is 3% of the investment cost of the entire grid covered by the Corporation. Actual allocation is conducted according to the actual situation.

Note 4) According to Da Nang Power Corporation, the reason why actual expenditures in 2016 and 2017 are significantly lower than the actual allocation is that costs on related equipment which have been originally anticipated were classified as investment budget due to the progress of unmanned substations.

Therefore, maintenance costs are properly secured and no particular problem has been identified regarding the financial aspects of operation and maintenance.

3.4.4 Status of Operation and Maintenance

Transmission, substation and distribution facilities developed by this project have been well maintained and managed, and are operating smoothly. No particular problem has been identified with subprojects that conducted site survey. According to interviews with each operation and maintenance organization, operation and maintenance activities are carried out based on each maintenance plan. For example, main operation and maintenance activities of subprojects under Hanoi Power Corporation are as follows.

- Daily maintenance: Operation and maintenance staffs of each substation undertake this maintenance in 3 shifts per day.
- Periodic maintenance (monthly, quarterly, and semi-annually): In addition to staffs engaged in operation and maintenance of each substation, engineers are dispatched from organizations/institutions responsible for operation and maintenance of the jurisdiction to undertake this maintenance.
- Periodic inspection (every half year, every year, every 3 years etc., inspection cycle differs depending on the equipment): A team of 10 to 15 staffs from Electricity Testing Company affiliated to Hanoi Power Corporation are dispatched and inspection is conducted over several days.

Records of daily operation and maintenance activities are prepared at each substation,

and regular reporting (monthly, quarterly, annually) are conducted to each power corporation, together with periodic maintenance records.

As regards spare parts, management systems within the EVN group called Maintenance Management Information Systems (MMIS) have been developed. Spare parts necessary for maintenance are stored in warehouses and the current situations have been constantly grasped. A system has been established to accommodate spare parts to be interchanged as necessary. In addition, some transformers and circuit breakers etc. need to be imported, so planned procurement is taking place.

Therefore, no particular problem has been identified regarding the current status of operation and maintenance.

No major problems have been observed in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore, sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project newly constructed and strengthened power transmission and substation facilities as well as improved distribution lines in industrial zones and the surrounding areas of Vietnam's principal urban areas with the aim of ensuring stable power supply to meet the rapidly growing power demand and reducing loss in power transmission and distribution. The objective of the project aiming at providing efficient and stable power supply to build a foundation for achieving Vietnam's industrialization is well consistent with the development policy and development needs of the country, as well as with Japan's ODA policy which put up active support for economic infrastructure development. Therefore, the relevance of the project is high. Regarding project implementation, both the project cost and project period exceeded the plan. Therefore, efficiency of the project is fair. Regarding project effectiveness, availability factor indicating the operation status against the rated value of facilities in the pilot area (Yen My District, Hung Yen Province) temporarily achieved the target, but the rate of load has been increasing given the background of rapidly increasing power demand in the area. However, actual figures of availability factor, annual forced outage hours per user and power transmission and distribution loss rates of other project target areas have all improved and users' satisfaction level is also generally high. Thus, it is judged that project effects have sufficiently generated. In addition, impacts of the project contributing to investment promotion and improved standard of living in project surrounding areas have also seen. Thus, its effectiveness and impact are high. No negative impact on natural environment has been

reported, and land acquisition process has taken place appropriately based on the relevant regulations in Vietnam; thus, no problem has been seen. No major problem has been observed in the institutional, technical and financial aspects of operation and maintenance as well as in the current status. In addition, maintenance situation of transmission and substation facilities as well as distribution facilities is also good and the facilities are operating smoothly. Therefore, sustainability of the project effects is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Necessity of continuous facility enhancement

Although development and expansion of transmission and substation facilities and distribution lines were undertaken by this project, it is necessary to continue strengthening transmission, substation and distribution facilities in order to ensure stable power supply in the face of growing power demand. For example, although the availability factor of transmission and substation facilities expansion project (subproject) in the pilot area of the project in Yen My District, Hung Yen Province decreased temporarily as a result of this project, ratio of maximum load to maximum output of facilities has increased since development of substation facilities could not keep up with the rapidly increasing power demand. When looking at the trend of power sales of this Province, the annual average growth rate between 2011 and 2017 is high as 17.3%, and the annual average growth rate in the same period in Nghe An Province and Ha Nam Province under the jurisdiction of Northern Power Corporation are also significantly rising – the average annual growth rates are 14.1% and 22.1%, respectively. Investment promotion is essential for Vietnamese government to achieve its policy goal to become an industrialized country by 2020, and infrastructure development in power sector (ensuring reliable, efficient and stable power supply), which is one of necessary factors for enabling business environment is important in the future.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Implementation of the project which has successfully taken advantage of the features of sector loan

This project consists of a number of subprojects and it can be regarded that the project has taken advantage of the features of sector loan – a loan project characterized by its

flexibility in terms of modification and changes of project scope in the process of implementation. Specifically, with the incidence of external factor such as fluctuations in the exchange rate during project period (depreciation of Vietnam Dong against Japanese yen), the executing agencies added subprojects by utilizing unused ODA loan balance. As a result, the number of subprojects has increased substantially by 2.52 times the original plan. Utilization of unused balance is not limited to sector loan projects, but it can be considered that by utilizing such external factor, the number of subprojects has flexibly increased. The additional subprojects all met the project purpose – to secure stable power supply responding to rapidly increasing power demand and to reduce transmission and distribution loss, thereby contributing to regional economic development and improvement of living standard. Also, the additional subprojects were all highly important and urgent as well as satisfied selection criteria required by JICA, thus they are deemed appropriate, commensurate with inputs. The project period was longer than planned since subprojects were added and implemented after the planned construction completion period assumed at the time of appraisal, however, loan period was not extended because loan disbursement period was set with a margin of more than four years after the assumed period of construction completion. In the future, when implementing similar sector loan projects, it is desirable that loan disbursement period to be set with margin like this project. It is important to pay attention during project supervision so that project scope can be changed flexibly in accordance with the circumstances while taking into consideration the project purpose.

End

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	・Construction and reinforcement of 110 kV power transmission lines ・Construction and expansion of 110 kV substations ・Expansion and rehabilitation of distribution line network * Number of planned subprojects: 25	・Corresponding to the initial project scope ・Corresponding to the initial project scope ・Corresponding to the initial project scope * Number of actual subprojects: 63
2. Project Period	March, 2008 – March, 2011 (37 months)	March, 2008 – December, 2015 (94 months)
3. Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total ODA Loan Portion Exchange Rate	 2,762 million yen 9,923 million yen (1,307,378 million VND) 12,685 million yen 10,906 million yen 1 VND=0.00759 yen (As of October, 2007)	 Unknown Unknown (Unknown) 13,576 million yen 10,648 million yen 1 VND=0.004894 yen (Average between 2008 and 2015)
4. Final Disbursement	July, 2015	

End

Socialist Republic of Viet Nam

FY 2017 Ex-post Evaluation of Japanese Grant Aid Project

"The Project for Reconstruction of Bridges in the Central District (Phase II), (Phase III)"

External Evaluator: Keiko Watanabe,
Mitsubishi UFJ Research and Consulting Co., Ltd.

0. Summary

The project was implemented aiming at securing safe and smooth traffic and improving the living standard and access to social services of local residents by reconstructing or newly constructing small and medium-sized bridges on rural roads in the central district where has been less developed and economically poor among Viet Nam. Roads development including bridges in rural areas was considered as the priority issue in the development policy of the Government of Viet Nam both at the times of planning and ex-post evaluation. For the central district where economic development has been delayed, the need for improvement of road network that is the key to logistics is high from the periods of planning to ex-post evaluation. In addition, there is a high need from the viewpoint of disaster prevention to improve roads and bridges in the central district where many disasters such as typhoons and floods are frequent. The project was in line with the Japan's ODA assistance policy at the time of planning. Therefore, the relevance of the project is high. The outputs were almost achieved as planned and both project cost and project period were within the plan. Thus, the efficiency is high. The operation and effect indicators such as reduction of impassable days due to floods and traffic of heavy-duty vehicles were confirmed as almost achieved their targets according to the interviews of relevant persons and actual field visits. The other positive impacts were also observed to a certain extent. Thus, the effectiveness and impact of the project are high. In regard to the sustainability, although there is no major issues overall, some minor problems remain in the institutional and financial aspects and current status. Therefore, sustainability of the project effects is fair.

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

1. Project Description

Project Locations

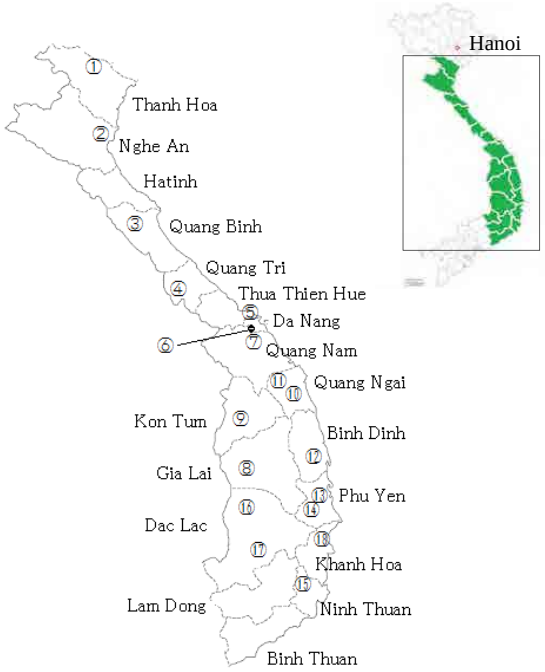
Tam Ngan Bridge

1.1 Background

Under the Doi Moi policy, the Government of Viet Nam, aiming for sustainable economic growth, put much importance on infrastructure development. “The Strategy for Transport Development in Vietnam by the Year 2020” developed by the Government of Viet Nam in 1988 sets the development goals on rural roads in three areas of road networks, northern mountainous area, the steep central mountainous area, and the Mekong Delta area. The Government of Viet Nam has already improved the bridges on rural roads in the northern area and the Mekong Delta area with the support of the Government of Japan. However, development was particularly delayed in the central district where was economically poor. Therefore, the improvement of road network that contributes to economic development was an urgent issue.

The bridges in the central district have been restored after the conclusion of the Viet Nam War and have been rehabilitated after the damages caused by flooding which occurs nearly every year. However, most of them were made in temporary structure due to lack of budget. Furthermore, many of them were severely damaged and could not allow not only heavy-duty vehicles but also light vehicles. There were some bridges where people could not even pass. As a result, many areas were completely isolated in the rainy season, which seriously hindered economic activities such as market shipment of agriculture products. In addition, such a situation had a great influence on access to social activities such as medical care and education.

Accordingly, the Government of Viet Nam requested the Government of Japan to reconstruct and establish the highly urgent bridges as part of measures to reduce poverty in the central district, following the “The Project for Reconstruction of Bridges in the Northern District” and “The Project for Reconstruction of Bridges in Mekong Delta Area”.



	No.	Bridge	Province/City
Phase II, Term I	1	Thach Dinh	Thanh Hoa
	2	Quynh Bang	Nghe An
	3	Lac Thien	Quang Binh
	4	Pha Nho	Quang Tri
	5	Khe Duong	Thua Thien Hue
	6	Hoi Phuoc	Da Nang City
Phase II, Term II	7	Dai Loi	Quang Nam
	8	Ia Drang	Gia Lai
	9	Ngoc Tu	Kon Tum
	10	Xa Cai	Quang Ngai
	11	Do	
	12	Ba Le	Binh Dinh
	13	Tra O	Phu Yen
	14	Tra Buong	
Phase III	15	Tam Ngan	Ninh Thuan
	16	Ea Soup	Dac Lac
	17	Krong K'mar	
	18	Ngoi Ngan	Khanh Hoa

Figure 1 Project Location Map

1.2 Project Outline

The objective of this project is to secure safe and smooth traffic throughout the year in rural roads in the central district of Viet Nam by reconstruction and establish 18 small and medium-sized bridges, thereby contributing to the improvement of living standard and access to the social services of the local people.

Grant Limit/Actual Grant Amount	Phase II, Term 1: 1,010 million yen /946 million yen Phase II, Term 2: 956million yen / 949 million yen Phase III: 749million yen /499 million yen
Exchange of Notes Date /Grant Agreement Date	Phase II, Term 1: June, 2003 Phase II, Term 2: July, 2004 Phase III: May, 2012 / May, 2012
Executing Agencies	Ministry of Transport
Project Completion	Phase II, Term 1: February, 2005 Phase II, Term 2: February, 2006 Phase III: June, 2014
Main Contractor	Phase II, Term 1: Obayashi Corporation Phase II, Term 2: Obayashi Corporation Phase III: Tekken Corporation

Main Consultants	Phase II, Term 1: Pacific Consultants International/Oriental Consultants Company Limited (JV) Phase II, Term 2: Pacific Consultants International/Oriental Consultants Company Limited (JV) Phase III: Oriental Consultants Company Limited
Basic Design	(Basic Design) July, 2001-March, 2002 (Preparatory Study for Phase III) December, 2011
Related Projects	＜Technical Cooperation＞ ・The Study on the National Transport Development Strategy (1999-2000) ＜Grant Aid＞ ・Reconstruction of Bridges in the Northern Area (E/N: 1996) ・Reconstruction of Bridges in the Mekong Delta Area (E/N: June, 2001) ＜World Bank＞ ・Rural Transport Project (1997-2001) ・Second Rural Transport Project (2000-2005) ・Third Rural Transport Project (2007-2012) ＜Asian Development Bank＞ ・Central Region Transport Networks Improvement Sector Project (2005-2012)

2. Outline of the Evaluation Study

2.1 External Evaluator

Keiko Watanabe, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

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

Duration of the Study: August 2017 – September 2018

Duration of the Field Study: November 6 –30, 2017, March 29 – April 6, 2018

2.3 Constraints during the Evaluation Study

The project was divided into three periods. Term 1 and Term 2 of the Phase II have been completed more than 10 years before. In addition, the executing agency has been changed in the middle of the implementation of Phase III (June 2013) due to the reorganization of the Ministry of Transport of Viet Nam. It was changed from Project Management Unit 2 (hereinafter referred

to as “PMU2”) to Project Management Unit 3 (PMU3) of the Directorate of Roads of Viet Nam (DRVN). Accordingly, the records of Term 1 and Term 2 of the Phase II have been transferred to PMU3. However, the location of those records was not identified at the time of ex-post evaluation. In particular, there was no detailed record on the situation during the construction period of Term 1 and Term 2 of the Phase II such as resettlement and land acquisition as well as project cost from the Vietnamese side. Therefore, some of the aspects had to be relied on available information and interview results from limited relevant stakeholders.

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

3.1 Relevance (Rating: ③[2])

3.1.1 Consistence with Development Plan of Viet Nam

The *Sixth Socio Economic Development Five-Year Plan* (1996-2000) at the time of planning stipulates the importance of “consideration for expansion of inequality between urban and rural areas”. In *Transport Development Strategy for Year 2020* (1998) formulated under the said five-year development plan, the development of rural roads is raised as priority issue and the main focus was placed on the improvement of roads and bridges to secure full-year traffic in the steep mountainous area of the central district.

The *Tenth Socio Economic Development Five-Year Plan* (2016-2020) at the time of ex-post evaluation stipulates the infrastructure development as one of three breakthrough strategies. The investment in transport network development especially for the inconvenient areas such as mountainous areas in the central district is regarded as high priority. In the *Adjustments to the Transport Development Strategy up to 2020 with a Vision towards 2030* (2009) formulated as a revision of the said strategy by the Ministry of Transport, the reconstruction/establishment of bridges is considered as the development goal of rural roads in order to secure the transportation route of agriculture, forestry and fishery products throughout the year and to resolve the division of transportation network between villages.

Furthermore, the *National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020* (2007) points out that the central district is a region which suffers from typhoon, storm surges, and floods along the coast and from flash flood disasters in the inland areas. For this reason, the construction of disaster resilient infrastructure is cited as a measure against floods.

Therefore, the project is well consistent with the Viet Nam development policy throughout the periods of planning and ex-post evaluation.

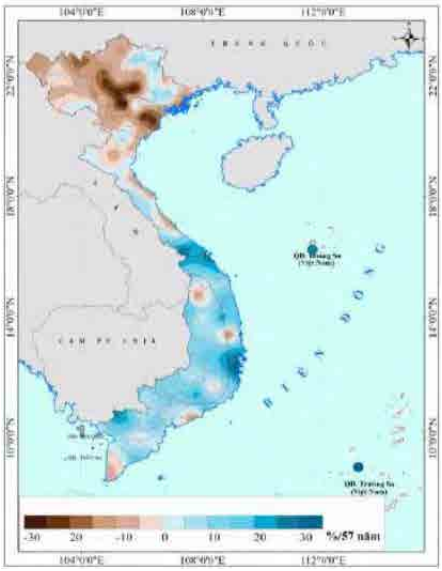
[1] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[2] ③: High, ②: Fair, ①: Low

3.1.2 Consistency with Development Needs of Viet Nam

At the time of planning, the industry structure of the central district in all provinces except Da Nang City depended on the primary industries such as agriculture, forestry and fishery. The economic growth of the region was greatly affected by the insufficient development of road network including bridge development. Many of the bridges in the central district were obsolete, temporary, having weight restriction and fears of falling. They became the obstacles of logistics from rural areas to outside areas. In addition, due to the low girder heights of existing bridges, they are covered by the flooded water at the time of rainy season, which resulted in the road closure and the local community became isolated. Therefore, securing the access to social services for local community was regarded as an urgent issue.

According to the executing agency at the time of ex-post evaluation, the economic development of the remote areas of the central district such as mountainous areas was still behind and it was pointed out that there was still a high need for the transport improvement.

Moreover, in the *National Strategy on Climate Change* (2011-2020), Viet Nam is stated as one of the countries with a great influence by climate change. It further presents that Viet Nam produced 9,500 deaths and missing people in flood, flash flood, landslide, mudslide and other disaster during ten years from 2001 to 2010. It shows that about 1.5% of the annual Gross Domestic Product (GDP) has been lost. The article of *the Voice of Vietnam*[3] reported that in 2016 ten typhoons and seven tropical cyclones occurred along the eastern coast of Viet Nam, which was more than the annual average of many years ago. In particular, in the central district, the river has not only been flooded 16 times, but those floods were more serious and prolonged than usual, causing huge damage to property and people. Furthermore, the report prepared by the Ministry of Natural Resources and Environment of Viet Nam (2016) presents the change in rainfall over 56 years from 1958-2014 as shown in Figure 1[4]. Rainfall has increased in almost all areas of the central district, the target area of the project. It has increased by more than 30% in the areas with high rainfall.



Source: Ministry of Natural Resources and Environment, Viet Nam

Figure 1: Change in Rainfall from 1958-2014 (%)

[3] http://english.vov.vn/society/how-has-climate-change-affected-vietnam-360127.vov (accessed on April 25, 2017)

[4] When we classified Viet Nam into seven climate zones, rainfall was increased 0.1%, 19.8% and 8.6% annually respectively in the northern central, southern central and central highlands areas that are the subjects to this project. "Climate Change and Sea Level Rise Scenarios for Viet Nam", Ministry of Natural Resources and Environment, 2016.

According to the above report, it is estimated that rainfall to these areas is expected to increase. In addition, the number of strong typhoons and very strong typhoons hit Viet Nam is also on a rising trend. Accordingly, the need for the project is also high from the viewpoint of measures against flood. From the above, the project is in line with the development needs of Viet Nam both at the time of planning and ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

Both *Japan's ODA Charter* (1992) and the *Country Assistance Program for Viet Nam* (2000) at the time of planning stipulate the importance of assistance in infrastructure development. The country assistance program especially set the transport infrastructure development as one of the five important areas of assistance and put much emphasis on further improvement of rural roads. In addition, the *Country Assistance Program for Viet Nam* (2009) at the time of planning of Phase III of the project, focuses on improving living and social aspects and reducing disparity in the country, with the central highland region as priority area. The rural infrastructure development is considered as its strategy. Furthermore, as a commitment to climate change measures, Japan has announced that she would support the developing partner countries to reduce the impact on climate change such as floods. Therefore, the project was in line with the Japan's assistance policy at the time of planning.

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

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

The project is to reconstruct and establish 18 small and medium-sized bridges in 15 provinces in order to ensure smooth road transport in the central district. Since the target bridges are scattered in the central district covering 1,300km north and south, the 18 bridges were implemented in three stages divided into three areas, north, central and south. Table 1 shows the actual output of the project.

Initially, 7 bridges in Phase II, Term 1, 8 bridges in Phase II, Term 2, and 7 bridges in Phase III were planned to be constructed. My Son Bridge in Phase II, Term 1 was excluded from the project due to the necessity of urgent implementation between the time of planning and the signing of official exchange of note, which had been carried out by the Vietnamese side. In regard to Tan Van Bridge, Da Dung Bridge and Tran Bridge, which had been planned in Phase III, became also out of scope of the project. They were constructed with the funds of Vietnamese side during about six years of vacant period from Phase II, Term 2 to Phase III as

the urgency was high during that time. Therefore, the evaluation was conducted considering the planned value as total of 18 bridges of reconstruction and establishment; 6 bridges in Phase II, Term 1, 8 bridges in Phase II, Term 2, and 4 bridges in Phase III. According to the hearing from the executing agency at the field visit, the main reason for delaying the implementation of Phase III was that Japan's ODA funds were relocated to other priority issues due to the Earthquakes off Sumatra (December 2014) and the Great East Japan Earthquake (March 2011). Therefore, it was confirmed that the delay was not caused by the project. When Phase III was planned again, only four bridges excluding three old bridges were considered as target. Therefore, it is considered that there is no change in the plan and in the actual number of bridges. During the construction period of 18 bridges, there were also changes from the plan such as the pile length, the position of the bridges, the height of the bridge pier, and the construction method. However, it was confirmed from the executing agency and the main consultant that these changes were based on the actual situation and had undergone appropriate procedures. Therefore, it can be judged that the total of 18 bridges including 6 bridges in Phase II, Term 1, 8 bridges in Phase II, Term 2, and 4 bridges in Phase III were reconstructed and established as planned.

Table 1: Comparison of Planned and Actual Outputs

	Plan (2001)								Actual
	No	Bridge	Province/City	Length (m)	Width (m)	Approach Rd (m)		Bridge Type*	
						Right	Left		
Phase II, Term 1	1	Thach Dinh	Thanh Hoa	92.3	5.5	157	97	PC Bridge	Change in Length of App. Rd. Right: 60m extension
	2	Quynh Bang	Nghe An	74.3	5.5	94	143	PC Bridge	As Planned
	3	My Son	Ha Tinh	Out of scope from the project					
	4	Lac Thien	Quang Binh	65.3	5.5	83	51	PC Bridge	As Planned
	5	Pha Nho	Quang Tri	54.2	5.5	60	64	Steel Bridge	As Planned
	6	Khe Duong	Thua Thien Hue	42.2	4.5	74	77	Steel Bridge	As Planned
	7	Hoi Phuoc	Da Nang City	65.3	5.5	92	112	PC Bridge	As Planned
Phase II, Term 2	8	Dai Loi	Quang Nam	65.3	5.5	86	65	PC Bridge	As Planned
	9	Ia Drang	Gia Lai	57.2	4.5	93	71	Steel Bridge	As Planned
	10	Ngoc Tu	Kon Tum	66.2	5.5	108	108	PC Bridge	As Planned
	11	Xa Cai	Quang Ngai	73.0	5.5	99	65	PC Bridge	As Planned
	12	Do		83.3	5.5	53	58	PC Bridge	As Planned

	Plan (2001)								Actual
	No	Bridge	Province/City	Length (m)	Width (m)	Approach Rd (m)		Bridge Type*	
						Right	Left		
	13	Ba Le	Binh Dinh	43.6	5.5	64	78	PC Bridge	As Planned
	14	Tra O	Phu Yen	33.8	5.5	143	90	PC Bridge	As Planned
	15	Tra Buong		62.6	5.5	129	70	RC Bridge	As Planned
Phase III	16	Tam Ngan	Ninh Thuan	71.3	5.5	23	187	PC Bridge	Change in Length of App. Rd Right:146.7m, Left:214.5m
	17	Ea Soup	Dac Lac	59.3	7.0	125	98	PC Bridge	As Planned
	18	Krong K'mar		71.3	7.0	126	147	PC Bridge	Change in Length of App. Rd Left: 127m
	19	Ngoi Ngan	Khanh Hoa	49.5	7.0	95	93	PC Bridge	As Planned
	20	Tan Van	Lam Dong	Out of scope from the project					
	21	Da Dung	Binh Thuan						
	22	Trang							

Source: Information provided by JICA

＊PC Bridge.: Pressed Concrete Bridge (Bridge with stronger than Reinforced Concrete), RC Bridge: Reinforced Concrete Bridge, Steel Bridge: Bridge with Steel to Girder

3.2.2 Project Inputs

As mentioned above, the blank period between Phase II, Term 2 and Phase III was caused by the external factors other than this project. Although the preparatory study was conducted twice during this blank period, it has not reached to E/N and the project has remained stopped. Therefore, this blank period is not considered in the evaluation of efficiency. Accordingly, regarding project cost and project period, the plan and actual of Phase II (Term 1 and Term 2) and Phase III were confirmed separately. In doing so, weighting was put taking into consideration the ratio of the number of bridges (Phase II (Term 1 and Term 2): 14 bridges, Phase III: 4 bridges) and judged comprehensively.

3.2.2.1 Project Cost

Table 2 shows the planned and actual project cost of Japanese side. As a result of weighting Phase II (Term 1 and Term 2) and Phase III by the number of bridges, the project cost was within the plan (90% of the planned amount). The information on the cost from the Vietnamese side could not be obtained. The actual amount is less than the planned amount due to the bidding result.

Table 2: Planned and Actual Project Cost

Phase	Plan (million yen)	Actual (million yen)	Planned Ratio	Number of Bridges	Weight
Phase II Term 1 and Term 2	1,010 956 Total 1,966	946 949 Total 1,895	96%	6 Bridges 8 Bridges	78% (14/18 Bridges.)
Phase III	749	499	67%	4 Bridges	22% (4/18 Bridges.)
Total Planned Ratio	Phase II Planned Ratio 96%×Weight 78% + Phase III Planned Ratio 67%×Weight 22% = 90%				

Source: Information provided by JICA

3.2.2.2 Project Period[5]

Table 3 shows the planned and actual of project period. As a result of weighting by the number of bridges as same as project cost, the planned ratio fell within the plan (99% of the planned period). In regard to Phase III, it is confirmed from the interview with the main consultant and executing agency that it took extra three months for the contractor's selection process before construction, however, the actual construction was implemented as planned. According to the executing agency, there was no problem with the project period and it is considered that the above difference did not affect the implementation of the project.

Table 3: Planned and Actual of Project Period

Phase	Plan	Actual	Planned Ratio	Weight
Phase II, Term 1- Term 2	34 months	32 months Phase II, Term 1 : July 2003 – February 2005 Phase II, Term 2 : July 2004 – February 2006	94%	78% (14/18 Bridges)
Phase III	21 months	24 months July 2012 – June 2014	114%	22% (4/18 Bridges)
Total Planned Ratio	Phase II Planned Ratio 94%×Weight 78% + Phase III Planned Raito 114%×Weight 22% = 99%			

Source: Information provided by JICA

Both the project cost and project period were within the plan. Therefore, efficiency of the

[5] The starting date of the project period is usually on the date of Exchange of Note (E/N). However, the starting date of the project period in the Ex-ante Evaluation was not clearly mentioned, therefore, the project period was adopted from the operation schedule in the Preparatory Study. Since the operation schedule started from the detailed design, the starting date was set on the date of detailed design (date of contract of the main consultant).

project is high.

3.3 Effectiveness and Impacts[6] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and effect indicators)

At the time of planning, three indicators; (1) mean daily traffic, (2) annual impassable days due to flooding, and (3) traffic of heavy-duty vehicles were set as the operation and effective indicators. In the Phase III, in addition to the above (2) and (3), (4) expansion of bridge width and (5) reduction of bridge maintenance and operation cost were listed. Table 4 and Table 5 show the operation and effective indicators. Furthermore, Table 6 presents the change and traffic condition of bridges before and after the project as a result of interview with bridge users at the time of ex-post evaluation[7].

(1) Mean daily traffic

The traffic volume survey has not been conducted by both the executing agency and the organizations in charge of bridge maintenance. Therefore, the target value of 2005 and the actual value at the time of ex-post evaluation could not be identified and the quantitative comparison could not be made. As shown in Table 6, before the project even though there were bridges, they were mostly suspension or wooden bridges which could not allow vehicles to pass. While, after the project, all bridges can accept heavy-duty vehicles up to 13t for transport (18t for two bridges). According to the interview with the residents nearby and maintenance organizations at the time of ex-post evaluation, it was confirmed that the traffic volume has been increased compared to before the project. The increase in traffic volume cannot rely solely on the effect of the project because the bridges reconstructed in Phase II Term 1 and Term 2 have been over 10 years old. However, from the changes of bridges condition before and after the project and the interview with the bridge users, it is assumed that the project surely contributed to a certain extent.

(2) Annual impassable days due to flooding

This indicator also could not be verified explicitly since the exact number of days was not recorded. According to the interview with the residents nearby the bridges and bridge users, as

[6] Sub-rating for Effectiveness is to be put with consideration of Impacts.

[7] At the time of ex-post evaluation, the field survey was conducted on 16 bridges excluding two bridges (Pha Nho Bridge and Ea Soup Bridge) among 18 target bridges. For the two bridges, the field survey could not be conducted because the roads leading to those bridges were not able to pass due to the influence of heavy rain. The interviews with bridge users were conducted for a total of 55 people (2-7 people per bridge), which include 45 residents nearby (agriculture and forestry workers, including 21 female), and 10 owners of restaurant or generals stores (including 6 female). Among interviewees there were four people (including two female) who received compensation by land acquisition.

shown in Table 6 it can be said that all bridges except Tra Buong Bridge are passable almost through the year besides the year of major floods (impassable day is 0). As increase in rainfall and a large-scale typhoons are occurring frequently in the central district mentioned in 3.1.2 “Consistency with Development Needs of Viet Nam”, large-scale floods that was not anticipated have also occurred once every few years. Although there is no accurate record, the interview with the nearby residents revealed that the impassable days of bridges have certainly been decreasing. Therefore, it is judged that the operation effect is almost achieved.

(3) Traffic of heavy-duty vehicles

As stated above, 16 bridges can accept heavy-duty vehicles up to 13t and two bridges (Ea Soup Bridge and Krong K’mar Bridge) can accept vehicles up to 18t. Most bridges are equipped with the traffic sings of weight restriction at their entrance, allowing heavy-duty vehicles to pass. Therefore, the target has been met.

(4) Expansion of Bridge width

This indicator was set for Phase III. As shown in Table 5, the target has been met.

(5) Reduction of Bridge maintenance and operation cost

This indicator was also set for Phase III. According to the interview with the Department of Transport (hereinafter referred to as “DOT”) in Dac Lac province which is the maintenance organization for Ea Soup Bridge and Krong K’mar Bridge, the periodic inspection and minor repair have been conducted in their jurisdictional areas by contracting with the external maintenance company. The maintenance cost of the two bridges are 6.25 million VND per year for Ea Soup Bridge, and 6.4 million VND per year for Krong K’mar Bridge, which achieved the target since they are within the target value. So far, the repair of approach roads of Krong K’mar Bridge which were damaged after the rainy season have been implemented. However, it should be noted that according to the DOT of Dac Lac province, the maintenance expenses are generally insufficient, so that the reduction of maintenance cost is partly due to the reduction of financial resources. The Department of Transport and Infrastructure of District People’s Committee which manages Tam Ngan Bridge pointed out that the bridge before the project was easily damaged by typhoons and floods since it was wooden suspension bridge. Maintenance cost arose each time when the repair or reconstruction was conducted. However, after the project, it was also said that the large-scale expenses never incurred by just conducting periodic inspection and cleaning. Therefore, the maintenance expenses were greatly reduced. The information on Ngoi Ngan Bridge could not be obtained. From the above, the project contributed to some extent to the reduction of maintenance cost, however, it is attributed to the

fact that overall financial resources are limited. From the point of sustainability described below, it is necessary to secure maintenance cost to a certain extent.

Table 4: Operation and Effect Indicator of Phase II, Term 1 and Term 2

Indicator	Baseline	Target	Actual (At the time of ex-post evaluation)
	2001	2005	2017
① Mean daily traffic	0-460 vehicles (Average 40 vehicles)	120-600 vehicles/day	Unknown
② Annual impassable days due to flooding	1-2 weeks	0 day (Average 4-7 days/year regarding the RC slab bridges[8] of Xa Cai Bridge and Tra Buong Bridge)	According to the interview results of residents nearby bridges, as shown in Table 6, annual impassable day is almost 0. (At the time of heavy flooding which has occurred 1-2 times after the completion of the project, Thac Dinh Bridge, Lac Thien Bridge and Xa Cai Bridge got immersed. Regarding Tra Buong Bridge, annual average impassable day is not known but it became impassable for two months after the heavy flood. After that it is flooded every year.)
③ Traffic of heavy-duty vehicles	-	Traffic of heavy-duty vehicle up to 13t	As planned.

Source: Information provided by JICA, Interview result from residents nearby the target bridges and bridge users at the time of ex-post evaluation

Table 5: Operation and Effect Indicator of Phase III

Indicator	Baseline	Target	Actual (at the time of ex-post evaluation)
	2011	2016	2017
① Decrease of Annual impassable days due to flooding	0-20 days (depending on bridge)	0 day	As planned
② Traffic of heavy-duty vehicles	Tam Ngan, Ngoi Ngan (only motor bike)	Vehicles up to 13t	As planned
	Ea Suop, Krong K'mar (Vehicles up to 18t)	Vehicles up to 18t	As planned

[8] Since the area was likely to suffer greatly from floods, it was designed to be a slab bridge so that the debris drifted by the flood could not catch on the guardrails of the bridge, keeping in mind that it will flood for several days.

Indicator	Baseline	Target	Actual (at the time of ex-post evaluation)
	2011	2016	2017
③Expansion of bridge width	Tam Ngan：1.4m	5.5m	As planned
	Krong K'mar: 4.4m	7.0m	As planned
	Ea Suop: 4.4m	7.0m	As planned
	Ngoi Ngan:3.5m	7.0m	As planned
④Reduction of bridge maintenance and operation cost	35.4-360.0 million VND/year (depending on bridge)	10.0 million VND/year	Ea Soup Bridge: 6.25 million VND/year Krong K'mar Bridge: 6.4 million VND/year Unknown for other bridges

Source: Information provided by JICA, Interview result from residents nearby the target bridges, bridge users and maintenance organizations of bridges at the time of ex-post evaluation

Table 6: Change in Situation, Passable Condition and Annual Impassable Days of Bridges

Phase	Bridge	Bridge		Traffic Condition		Impassable Days per Year (from the interview results)	
		Before the Project*	After the Project	Before the Project	After the Project	Before the Project	At the time of ex-post Evaluation
Phase II, Term 1	Thach Dinh	Pontoon Bridge	PC Bridge	Motorbikes, boats when flooding	Vehicle up to 13t	One month in worse time	0 day (3-4 days only in two years which had severe flooding)
	Quynh Bang	Steel Bridge	PC Bridge	Motorbikes, Bicycles, Pedestrians	Vehicle up to 13t	4-5 days	0 day
	Lac Thien	Suspension Bridge for pedestrians	PC Bridge	Motorbikes, Bicycles, Pedestrians	Vehicle up to 13t	1-2 months during rainy seasons	0 day (Evacuated for two month only once in a year of a big flood)
	Pha Nho	Steel Bridge	Steel Bridge	Heavy-duty Vehicles are not allowed	Vehicle up to 13t	Days not identified	0 day (but 1 week because of surrounding roads were flooded)
	Khe Duong	No Bridge	Steel Bridge	Pedestrians (Bamboo Bridge)	Vehicle up to 13t	—	0 day (4-5days because the surrounding roads are flooded)
	Hoi Phuoc	No Bridge	PC Bridge	—	Vehicle up to 13t	—	0 day

Phase	Bridge	Bridge		Traffic Condition		Impassable Days per Year (from the interview results)	
		Before the Project*	After the Project	Before the Project	After the Project	Before the Project	At the time of ex-post Evaluation
Phase II, Term 2	Dai Loi	Wooden Bridge	PC Bridge	Motorbikes, Bicycles, Pedestrians	Vehicle up to 13t	Days not identified	0 day
	Ia Drang	Steel Bridge	Steel Bridge	Motorbikes, Bicycles, Pedestrians	Vehicle up to 13t	No traffic at the time of flood	0 day
	Ngoc Tu	Suspension Bridge for pedestrians	PC Bridge	Motorbikes, Bicycles, Pedestrians	Vehicle up to 13t	No traffic at the time of flood	0 day
	Xa Cai	RC Bridge	RC Bridge	Motorbikes, Bicycles, Small cars	Vehicle up to 13t	No traffic at the time of flood	0 day (Impassable only once at the time of severe flooding)
	Do	No Bridge	PC Bridge	—	Vehicle up to 13 t	No traffic at the time of flood	0 day
	Ba Le	RC Bridge	PC Bridge	Motorbikes, Bicycles, Small cars	Vehicle up to 13t	Days not identified	0 day (but surrounding roads become flood)
	Tra O	Steel Bridge	PC Bridge	Motorbikes, Bicycles, Small cars	Vehicle up to 13t	Days not identified	0 day
	Tra Buong	No Bridge	RC Bridge	—	Vehicle up to 13t	8-10 days (since 4-5 years ago)	Two months at the time of the 2009 severe flood. Flooded every year even after that.
Phase III	Tam Ngan	Suspension Bridge for pedestrians	PC Bridge	Motorbikes, Bicycles, Pedestrians	Vehicle up to 13t	4-7 days	0 day
	Ea Soup	Steel Bridge (Bailey Bridge)	PC Bridge	Vehicles, Tracks (18t)	Vehicle up to 18t	Days not identified	0 day
	Krong K'mar	Steel Bridge (Eiffel Bridge)	PC Bridge	Motorbikes, Trucks (5t) but have safety problem	Vehicle up to 18t	Days not identified	0 day

Phase	Bridge	Bridge		Traffic Condition		Impassable Days per Year (from the interview results)	
		Before the Project*	After the Project	Before the Project	After the Project	Before the Project	At the time of ex-post Evaluation
	Ngoi Ngan	Wooden Bridge	PC Bridge	Motorbikes, Bicycles, Pedestrians	Vehicle up to 13t	Days not identified	0 day

＊1：Even there was “no bridge” at the time of planning, there were cases where bridges that were previously broken by floods or wars, or there were submerging bridges such as made of bamboo.
Source: Information provided by JICA, Interview result from residents nearby the target bridges, bridge users at the time of ex-post evaluation

Trao O Bridge,
At the time of Planning (2001)

Trao O Bridge
At the time of Ex-post Evaluation (2017)

Quynh Bang Bridge
At the time of Planning (2001)

Quynh Bang Bridge
At the time of Ex-post Evaluation (2017)

Tam Ngan Bridge, At the time of Planning of Phase III (2011)

Tam Ngan Bridge At the time of Ex-post Evaluation (2017)

Source: Photos at the time of planning are from information provided by JICA and the photos at the time of ex-post evaluation are taken by the external evaluator.

3.3.1.2 Qualitative effects (Other Effects)

At the time of planning, securing the safe and smooth traffic was expected as qualitative effect.

The effect on safe traffic was confirmed since many respondents raised safety effect in particular at the interview with the residents nearby bridge, bridge users and maintenance organizations. According to the interview, the aging and vulnerable bridges were frequently washed away and some people fell to die by forcibly crossing such bridges before the project. Therefore, many expressed appreciation that the children especially became able to attend school safely. In addition, it was confirmed that the project has provided the smooth traffic network for the areas where the traffic was stopped by flooding and for the people who had to wait for more than one hour to cross over to the other side by boat (for example, Tach Dinh Bridge, Dai Loi Bridge and Xa Cai Bridge), and who had to take a detour to nearby towns because there was no bridge (Pha Nho Bridge and Hoi Phuoc Bridge). Accordingly, it can be said that the project contributed to safe and smooth traffic.

3.3.2 Impacts

3.3.2.1 Intended Impacts

In this project, “Improvement of living standard of local people” and “Improvement of access to social services” were expected as impacts. The appearance of these impacts is described below.

（1） Improvement of living standard of local people

Table 7 shows the GDP growth rate of the provinces where the bridges were installed as a reference. From 2001 before the plan, GDP growth rate shows a high value every year. Most of the provinces exceeded the country average of Viet Nam. Especially the provinces implemented

in Phase II (Term 1 and Term 2) recorded a high growth rate of 8% to 14% in 2006 which was year of the completion compared to the previous year. The provinces which were targets of four bridges in Phase III also recorded growth rate of 6% to 8% in 2016 after the completion, which was higher than country average. This project was to reconstruct the small bridges in rural areas and it is not possible to measure the economic impact only from the project. However, it is presumed that there was certain effect on economic growth.

Table 7: Change in GDP Growth Rate of the Bridge Installed Province/City Before and After the Project

Unit (%)

Phase	Bridge	Province/City	2001	2006	2011	2016
Phase II, Term 1	Thach Dinh	Thanh Hoa	8.20	10.61	12.26	9.13
	Quynh Bang	Nghe An	9.24	10.00	10.71	6.95
	Lac Thien	Quang Binh	7.30	11.40	8.31	5.79
	Pha Nho	Quang Tri	7.50	11.64	9.50	6.35
	Khe Duong	Thua Thien Hue	9.10	13.24	10.76	6.98
	Hoi Phuoc	Da Nang City	N/A	8.96	27.26	18.81
Phase II, Term 2	Dai Loi	Quang Nam	N/A	13.46	12.45	8.49
	Ia Drang	Gia Lai	7.91	14.62	13.00	7.79
	Ngoc Tu	Kon Tum	11.43	13.79	14.34	6.15
	Xa Cai	Quang Ngai	5.50	12.46	7.24	4.67
	Do					
	Be Le	Binh Dinh	5.80	12.13	10.38	7.17
	Tra O	Phu Yen	9.00	12.64	13.05	0.86
	Tra Buong					
Phase III	Tam Ngan	Ninh Thuan	9.10	14.12	11.20	8.18
	Ea Soup	Dac Lac	N/A	9.11	7.71	6.35
	Krong K'mar					
	Ngoi Ngan	Khanh Hoa	10.78	9.70	8.05	6.57
Viet Nam Total			6.89	8.23	5.89	6.21

Source: General Statistics office of Viet Nam

At the interview with the surrounding residents conducted at the time of the surveying the target bridges, almost all people pointed out the economic effect by the project. Most of the surrounding residents were engaged in agriculture and forestry. Before the project since only bicycles, motorbikes and pedestrian could cross the bridges, they had to use bridges back and forth many times to carry seedlings and fertilizers. After the project, it became easier to transport large quantities by car and heavy-duty trucks, which led to a reduction in transportation cost. There were answers that due to the reduction in transportation cost, the income has raised by increasing the production of agricultural products and cutting out a lot of timber. Many owners of restaurants and general stores also responded that their revenues had

been raised by the reduction of transport cost for purchasing goods and the increase in customers because it made easier for them to obtain goods according to the customers' request.

Furthermore, there were also responses that for the areas around Lac Thien Bridge and Pha Nho Bridge which were isolated without bridges before the project, they could receive economic benefit through the access to the towns by having the bridges. As described in the column below, since the target bridges linked to the tourist places and industrial areas, the flow of tourist and residents were increased, population near the bridges grew and new shops were also built. It can be said that the project contributed to a certain extent to the improvement of living standard of the local people considering the fact that the target areas have been developed, although the other factors can be thought than the project since the bridges reconstructed in Phase II (Term 1 and Term 2) were more than 10 years old.

Column: Changes before and after the project from the interview with residents and shops near the bridges

＜A Farmer near Thach Dinh Bridge＞

There are many sugar cane farmers near the bridge. After Thach Dinh Bridge was reconstructed, we could transport larger amount of sugar cane than before the project to the Taiwanese capital sugar factory across the bridge. Then, we increased the production, which led to the increase in income.

＜A Restaurant near Hoi Phuoc Bridge＞

After the hot spring facility was built in the neighborhood, the tourists who come to the facility crossing the bridge were increased. Accordingly, the shops along the roads were increased and the regional economy was revitalized.

＜A Resident near Tam Ngan Bridge＞

Before the project, because the broker came by motorbike, he did not purchase the cultivated corn so much. After rebuilding Tam Ngan Bridge, he became to come with a car and purchased a large amount. Therefore, we could increase the production by 30 to 40kg more, leading to an increase in revenue than before.

Furthermore, the road on Tam Ngan Bridge is leading to the industrial area where many local people are hired at the Korean capital chili source factory and so on. The bridge became a commuting road for these people, contributing to the development of the local economy.

Source: Results of the interview at the time of ex-post evaluation

（2） Improvement of access to social services (schools, hospitals, government offices, etc.)

According to the interview with the residents nearby bridges, it was confirmed that the project has contributed to improving the convenience to residents by the fact that the regular bus services became more frequent (Do Bridge, Krong K'mar Bridge), and that taxis and rent-a-car companies service became available (near Ngoc Tu Bridge). In addition, at many bridges which were surveyed, the residents of surrounding areas pointed out that it became easier and safer to access schools and hospitals (Thach Dinh Bridge, Ia Drang Bridge, Xa Cai Bridge, and Do Bridge). The principal of a junior high school for the hill tribes in the vicinity of Do Bridge pointed out the following educational effect. Before the project many students dropped out as a result because they could not come to school for a long time after flooding. However, after the bridge was built, the students did not have to break a school and the number of drop out was reduced. In addition, the class could proceed as planned. The other residents pointed out that they could now call ambulance to the area where there was no bridge before. Therefore, it can be thought that the project has contributed to a certain extent to the improvement of access to social services for the local people.

3.3.2.2 Other Positive and Negative Impacts

（1） Impacts on the Natural Environment

There is no serious environmental problem.

Since the scale of the bridges of the project is rather small, the impacts on the natural environment was only piling, temporary sludge of river water due to bottom excavation at the time of construction of lower part of bridge and little noise. Therefore, the environmental effect was limited. The interview with the executing agency, maintenance organizations of bridges and residents nearby confirmed that there were no impacts on the natural environment.

（2） Resettlement and Land Acquisition

Regarding Phase II (Term 1 and Term 2), the detailed information of resettlement and land acquisition was not identified since the records could not be obtained. Table 8 shows the plan and actual of resettlement and land acquisition of Phase III.

Table 8: Plan and Actual of Resettlement and Land Acquisition of Phase III

Bridge	Situation at the time of planning (2011)	Actual (2012)
Tam Ngan Bridge	・Target households: 11 Households After the agreement, the compensation was paid to seven households by 2007. For the other four households, as soon as the implementation schedule is fixed, the compensation agreement and payment will be done. ・Regarding other three organizations (electric distribution company and others), two were completed. The agreement will be concluded before the construction for the remaining land, a part of the backyard of the church.	・The payment has done in 2011 for the remaining four households. ・The agreement has been made before the construction (2012) for the remaining one organization.
Ea Soup Bridge	・Target households: 12 households The agreement was made for all target households and the compensation was completed in 2007. ・Compensation was completed for other two households which had partly affected.	Same as on the left
Krong K'mar Bridge	・Target households: 13 households Compensation was completed for all target households in 2007. ・Three houses of resettlement households has been completed the relocation.	Same as on the left
Ngoi Ngan Bridge	・Target Households: 19 households Two households are stakeholders for resettlement out of total target (one of them has relocated). The agreement and compensation have been completed for all households in 2006.	Same as on the left

Source: Information provided by JICA, Results of interview at the time of ex-post evaluation

According to the executing agency, since the resettlement and land acquisition were small scale, it was not necessary to develop a resettlement plan. Nonetheless, it was processed in accordance with the regulation of the Government of Viet Nam and there were no particular problem in the process. The hearing from the people who have been affected by the land acquisition (four people) revealed that they were satisfied with the process and compensation of the land acquisition. The main consultant also cited that the residents were cooperative for resettlement and land acquisition since their expectation on the project was great. Although the interview could not be made for the resettlement affected people, according to the residents near the bridge and executing agency, there were no cases that the affected people had complained. Therefore, it is considered that there were no specific problem on resettlement and land acquisition.

（3） Other Impacts

The target areas of the project were vulnerable to flooding and typhoon. As stated in 3.3.1 “Effectiveness”, the target bridges have been elevated and most of the bridges became passable throughout the year. However, there were many areas where the roads leading to the bridges were covered with water by flood. Therefore, some of the bridges (Dai Loi Bridge, Be Le Bridge and others) have been playing unexpected role such as being used for evaluation place for valuables such as livestock and motorbikes at the time of flooding.

Regarding the increase in traffic volume which was set as one of the operation and effective indicators, its quantitative changes could not be verified. However, it can be said that the project contributed to a certain extent to the increase in traffic considering the situation of the bridges before and after the project. That is to say, heavy-duty vehicles can cross the bridges throughout the year and the residents surrounding the bridges answered at the time of ex-post evaluation that the traffic volume has increased at almost all bridges. The target bridges, except Tra Buong Bridge, for which the impassable day was around 0 to 20 days in a year, became bridges that can be passable almost throughout the year with exception of the years when one or two floods had occured after the completion of the project. The reduction of maintenance cost of the temporary bridges such as wooden bridges and Bailey bridges has been almost realized since the maintenance cost took every time they were destroyed by flooding. In addition, it was confirmed that the project has contributed greatly to the smooth and safe traffic.

Regarding the impact, a certain extent impact has been appeared on the improvement of living standard of local people and upgrading the convenience to social access such as schools and hospitals. No negative impact on natural environment has been observed. Resettlement and land acquisition was implemented in accordance with domestic regulation.

This project has largely achieved its objectives. Therefore, effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

After the completion of the project, the target bridges have been taken over to DOT of local provinces. Actual maintenance is conducted either by provincial DOT, division in charge of district people’s committee (hereinafter referred to as “PC”) , or division in charge of local commune PC depending on classification of roads (provincial roads, district roads, commune roads and so on) and location. Table 9 shows the classification of roads on the target bridges and maintenance organizations in charge[9]. Among 18 target bridges, 8 bridges are administered by

[9] According to the executing agency, even for the bridges located in rural area, if the bridge is located on the national

DOT, 7 bridges are by district PC and 3 bridges are by commune PC.

Table 9: Maintenance Organizations and Road Classification of the Target Bridges

Bridge	Province/City	Maintenance Organization	Road Classification (at the Time of Ex-post Evaluation)
Thach Dinh	Thanh Hoa	Thach Thanh District PC	Provincial Roads
Quynh Bang	Nghe An	Nghe An DOT	National Roads
Lac Thien	Quang Binh	Minh Hoa District PC	District Roads
Pha Nho	Quang Tri	Huong Hoa District PC	District Roads
Khe Duong	Thua Thien Hue	Phu Loc District PC	Commune Roads
Hoi Phuoc	Da Nang City	Hoa Vang District PC	Provincial Roads
Dai Loi	Quang Nam	Dai Nghia Commune PC	Commune Roads
Ia Drang	Gia Lai	Ia Drang Commune PC	District Roads
Ngoc Tu	Kon Tum	Dak To District PC	District Roads
Xa Cai	Quang Ngai	Nghia Hanh Commune PC	Commune Roads
Do		Quang Ngai DOT	Provincial Roads
Ba Le	Binh Dinh	Bing Ding DOT	Provincial Roads
Tra O	Phu Yen	Phu Yen DOT	National Roads
Tra Buong		Phu Yen DOT	Provincial Roads
Tam Ngan	Ninh Thuan	Ninh Son District PC	District Roads
Ea Soup	Dac Lac	Dac Lac DOT	Provincial Roads
Krong K'mar		Dac Lac DOT	Provincial Roads
Ngoi Ngan	Khanh Hoa	Khanh Hoa DOT	Provincial Roads

Source: Executing agency and results of the interview to DOTs in each province at the time of ex-post evaluation

The structure of DOT varies depending on the province, however, there are about 30 to 50 staff members as a whole. Actual maintenance is usually outsourced and division in charge of maintenance (the name is Transport and Infrastructure Division, etc.) administers the implementation. There are about 4-5 staff members in the maintenance division and most of them are engineers who have basic technical knowledge. These staff members also engage in road inspection and develop a maintenance plan. Therefore, there is no problem in organization.

The number of staff members of the transportation and infrastructure department (the name differs depending on the district PC) is depending on the district PC but it is about 1-10

roads and strategically important roads (trunk roads between big cities), the Road Management Bureau of DRVN at the central level is in charge of maintenance. However, in the case of this project, both Quynh Bang Bridge and Tra O Bridge which are on the national roads, are managed by DOT of each province. Furthermore, if the bridge is located at the remote areas away from the central part, it may be entrusted to a neighboring commune PC.

staff members. Actual inspection is done by them or outsourced depending on the budget. However, some problems remains in organizational set up for periodic inspection since most of the district PC are shortage of staff members.

For the bridge located in the very remote area, the maintenance is commissioned to local commune PC from the district PC. There are only one to two staff members in charge of maintenance in commune PC and the maintenance budget is generally limited. Therefore, it is difficult for commune PC to outsource the maintenance even if the staff members are scarce and there is no structure to conduct periodic monitoring. Accordingly, there are some challenges in the maintenance system at the commune level.

People's Committees are set up in provinces, districts and commune respectively. Although each department in charge of maintenance administers the same roads, they work separately. The technical consultation can be made to DOT at the province, however, there is no system of cooperation. Therefore, there is no problem in maintenance system of DOT, however, some problems are observed in the maintenance system in part of the district PC and commune PC.

3.4.2 Technical Aspect of Operation and Maintenance

At DOT, the manuals and guidelines formulated by DVRN, Ministry of Transport, are put in place and subcontractors conduct maintenance in accordance with these manuals and guidelines. Some of the maintenance staff members of DOT are university graduate and postgraduate level engineers, so that they have basic skills and knowledge of maintenance. In addition, the annual training plan is formulated and there are opportunities for DOT staff to receive training on technical and management issues once to twice a year.

Officers in charge of maintenance at the district PC are often engineers and they have basic skills and knowledge. On the contrary, at the commune level, the number of staff members is short and the budget is limited, so there are few opportunities to upgrade and improve technical skills through trainings. However, since it is possible to consult with district PC and DOT staff members if there is big problem, it is considered that some level of maintenance skills is guaranteed.

3.4.3 Financial Aspect of Operation and Maintenance

DOT conducts the inspection of the jurisdiction roads including bridges periodically through subcontractors. Based on the result, a maintenance plan is formulated and they request budget to respective provincial PC. Based on the approved budget, actual repair and maintenance are entrusted to the maintenance company for implementation. Also in the transport department of the district PC, based on the inspection results of roads and bridges

under its jurisdiction which is carried out independently or outsourced, a maintenance plan is formulated and budget is requested to district PC. The same procedure is implemented in the commune PC. However, at any level, the actual allocation amount is only about 20 to 40% of the required amount of the budget. It cannot be said that the sufficient budget is secured.

For example, in the case of Phu Yen DOT, the maintenance budget for 2017 for national roads was about 50 million VND (about 250,000 yen) per kilometer, and about 20 million VND (about 100,000 yen) for provincial roads. If calculated by meter, it will be only 250 yen for national roads and 100 yen for provincial roads per meter. For the case of Tra O Bridge (on national roads) in Phu Yen province, since the bridge length is 33.8m, if calculated simply, the annual maintenance budget will be only about 8,450 yen. According to Phu Yen DOT, only 40% of the necessary amount has been allocated although at least about 50 million VND (about 250,000 yen) is required for maintenance of provincial roads per kilometer. In addition, in Dac Lac DOT which administers 345 km of provincial roads, the annual maintenance budget was 30 billion VND (about 150 million yen) for provincial roads. Thus, the budget becomes 440,000 yen per kilometer, in other words, 440 yen per meter. At planning time of Phase III of the project, it was estimated that periodic inspection, repair and maintenance cost[10] would be about 120,000 yen per bridge. From this calculation, the maintenance cost will become 240,000 yen for the two bridges (Ea Soup Bridge and Krong K'mar Bridge) installed in Dac Lac province, which account for about 1.6% of the total provincial road maintenance cost of Dac Lac province. However, the total bridge length of the two bridges is 131m and there is only a budget of 440 yen per meter, so it is calculated that they can only spend 57,640 yen per year for the two bridges. Since the bridges do not have to be repaired every year, the estimation cannot be made such simple way. However, it cannot say that it is financially sufficient considering 240,000 yen are necessary for the two bridges. According to the Dac Lac DOT, the maintenance budget is allocated about 20% of requested amount for provincial roads and 30% to 40% for national roads every year. According to the interview with the district PC which administers Tam Ngan Bridge, only about 30% of the requested amount has been allocated for the budget of new roads construction and maintenance cost. In the case of the Nghia Hanh commune PC which administers Xa Chai Bridge, they answered that they have requested the district PC for 5 billion VND (about 25 million yen) as a maintenance budget for 2017, but in fact that only 1.5 billion VND (about 7.5 million yen), 30% of requested amount, was allocated. As described later in "3.4.4. Status of Operation and Maintenance", there are cases where necessary repair has not been implemented for many years due to lack of the budget. Therefore, some problems remain in financial aspect for operation and maintenance.

[10] Preparatory Survey Report (p.3-22)

3.4.4 Status of Operation and Maintenance

The status of maintenance of the target 18 bridges was generally good. In particular, the bridges of Phase II (Term 1 and Term 2) have been more than 10 years since completion, however, there were no bridges that had major obstacles to traffic.

It was confirmed that for the bridges administered by DOT, the periodic inspection was conducted by outsourcing in accordance with the manuals of the Ministry of Transport. For the bridges under the jurisdiction of district PC and local commune PC, although it was not possible to conduct periodic maintenance due to budget, if the community resides near the bridges, they were cleaning bridges at least once a year after the flood season or before festivals such as New Year. It was also observed that there were bridges which had evidence of repainting and repair (Quynh Bang Bridge, Khe Duong Bridge, Hoi Phuoc Bridge, Do Bridge, Tra O Bridge). Thus, it is considered that the minimum level of maintenance is being conducted.

On the other hand, it was also observed that there were bridges that were hardly maintained with the sand accumulation in the drain outlets and weeds growing on the bridges (Thach Dinh Bridge, Lac Thien Bridge, Dai Loi Bridge, Ia Drang Bridge and Do Bridge). In addition, there was a bridge (Ngoc Tu Bridge) where the guardrails remained broken due to the budget since the severe flood in 2009 although immediate repair should be required for safety.

Therefore, although there is no serious problem found in the status of operation and maintenance, some concerns remain.

Some minor problems have been observed in terms of the institutional aspect, financial aspect and current status. Therefore, sustainability of the project effects is fair.

Regarding Tra Buong Bridge, the demolition began in October 2017 which was the time of ex-post evaluation and a newly constructed bridge was in operation. According to the Phu Yen DOT which administers the bridge, there have been floods nearly every year in the area and after the enormous damage has occurred by the big flood in 2009, the Vietnamese government approved that the total roads of 61.3km including Tra Buong Bridge and other seven bridges would be elevated and widen. Then the improvement project has been started since 2012. The new Tra Buong Bridge was constructed with 6m elevated than the bridge constructed in this project. In the project, Tra Buoung Bridge has reconstructed in 2006 as planned, and it produced effectiveness and impact by the time of ex-post evaluation and been maintained after the completion. Therefore, it was decided that the demolition itself would not be included in the evaluation judgement of this ex-post evaluation.

Lac Thien Bridge with dirt accumulation and weeds growing

Ia Drang Bridge where drainage ditch is filled with dirt

Ngoc Tu Bridge with broken guardrails by the severe flood in 2009

Khe Duong Bridge with repaired guardrails

Tra O Bridge with repainting

New and Old Tra Buong Bridge
(Left is the bridge by this project)

Source: Photos taken by the external evaluator at the time of ex-post evaluation

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project was implemented aiming at securing safe and smooth traffic and improving the living standard and access to social services of local residents by reconstructing or newly constructing small and medium-sized bridges on rural roads in the central district where has been less developed and economically poor among Viet Nam. Roads development including

bridges in rural areas was considered as the priority issue in the development policy of the Government of Viet Nam both at the times of planning and ex-post evaluation. For the central district where economic development has been delayed, the need for improvement of road network that is the key to logistics is high from the periods of planning to ex-post evaluation. In addition, there is a high need from the viewpoint of disaster prevention to improve roads and bridges in the central district where many disasters such as typhoons and floods are frequent. The project was in line with the Japan's ODA assistance policy at the time of planning. Therefore, the relevance of the project is high. The outputs were almost achieved as planned and both project cost and project period were within the plan. Thus, the efficiency is high. The operation and effect indicators such as reduction of impassable days due to floods and traffic of heavy-duty vehicles were confirmed as almost achieved their targets according to the interviews of relevant persons and actual field visits. The other positive impacts were also observed to a certain extent. Thus, the effectiveness and impact of the project are high. In regard to the sustainability, although there is no major issues overall, some minor problems remain in the institutional and financial aspects and current status. Therefore, sustainability of the project effects is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

（1） As pointed out at the time of ex-post evaluation, Dac To district PC which administers Ngoc Tu Bridge is supposed to conduct repair of its guardrails immediately with the support of Kon Tum provincial DOT. DRVN, which is the executing agency, should monitor the implementation status of repair and confirm its completion.

（2） Even if the bridge itself has no problem at the time of flooding, since the roads leading to the bridges are covered with water, there are areas where the road network cannot be functioned as a result (near the areas of Pha Nho Bridge, Khe Duong Bridge, Ngoc Tu Bridge, Tra O Bridge, Ea Soup Bridge and Krong K'mar Bridge). In order to maximize the development objective and effectiveness of the project, the roads development in rural areas of the central district should keep steadily promoted.

（3） The demolition of Tra Buong Bridge was identified by the ex-post evaluation. There was no report on the decision and background reasons of demolition to JICA from the Vietnamese government. After the completion of the project, the target bridges were taken over to DOT of each province and the maintenance has been basically done at the

regional level. Therefore, there is no substantial involvement of the executing agency after the project. However, since it is the ODA project, the executing agency, DRVN, should create a system to receive reports in advance from the maintenance organizations when there are any changes and should also report in advance to JICA. Following the suggestions from the ex-post evaluation, the executing agency has already issued an official letter to the provincial DOTs of the target bridges requesting for monitoring the maintenance work and for reporting to the executing agency in case any damage or renovation of any facilities. However, the executing agency should conduct the periodic monitoring to the extent possible and find the status of the project.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Promote community participation in daily maintenance from the construction period where applicable

Due to the financial issues in the maintenance organizations, the daily maintenance such as cleaning drainage and weaving has to be depended on the voluntary implementation of surrounding community. In fact, there are many sites that the surrounding communities conduct cleaning bridges two to three times a year before the festival or after the rainy season. Even so, there were bridges where the drainages were clogged with sediments and weeds were growing. Since the communities have high expectation to the project that directly affects their own living and understand fully the effectiveness of the bridges, it would be possible to ask their cooperation. In the case where residents live near the bridge, it should be considered the maintenance system that involves community by conducting awareness raising activities from the period of construction with gaining their understanding and cooperation in order to ensure the sustainability.