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

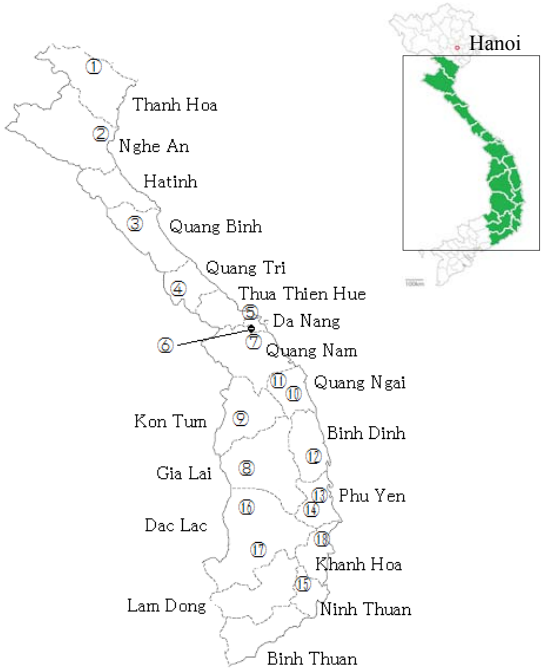
Tam Ngan Bridge

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.

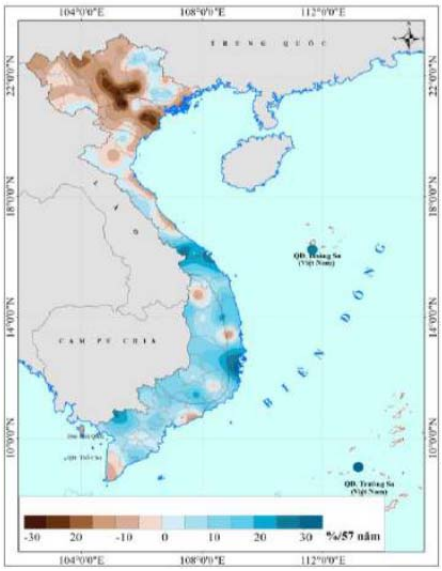
[1] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[2] ③: High, ②: Fair, ①: Low

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.