

Socialist Republic of Vietnam

FY2019 Ex-Post Evaluation of Japanese ODA Loan
“National Highway No. 1 Bypass Road Construction Project / National Highway No. 1 Bypass
Road Construction Project (II),
Cuu Long (Can Tho) Bridge Construction Project / Cuu Long (Can Tho) Bridge Construction
Project (II)”

External Evaluator: Ryujiro Sasao, IC Net Limited

0. Summary

This project aims to improve the efficiency of logistics in the Mekong Delta region by constructing the Cuu Long (Can Tho) Bridge crossing the Hau River, a tributary of Mekong River and related approach roads in the South Vietnam.

Its implementation fully matches the Vietnamese government’s development plan, needs and Japan’s ODA policy to Vietnam, indicating the project’s high relevance. The project budget was revised because of the global rise in prices of construction materials after the first appraisal and the changes in the extent and design of the construction in line with the site condition (soft ground). Further, the tentative piers of the bridge collapsed. Nevertheless, the bridge was constructed successfully and the number of vehicles that pass the bridge significantly increased after the completion of the project. In addition, local residents are not required to wait for ferry departure times anymore and the bridge offers many concrete benefits such as reduced travel time, decreased influence of bad weather, and improved traffic access to many places. Furthermore, socio-economic statistics seem to indicate the realization of an impact brought by the project. Accordingly, we find that both effectiveness and impacts have reached the originally expected level. However, the project’s efficiency is low, because the project cost could not be confirmed for a lack of information, and the actual project duration exceeded the planned one significantly. The operation and maintenance of this project has no particular problem in its institutional/organizational, technical, and financial aspects. The sustainability of the project’s effects is high.

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

1. Project Description



Project Location



Can Tho Bridge

1.1 Background

Geographically, Vietnam has an elongated shape: it extends 1,650 km from north to south, and the country's widest portion from east to west is 600 km. Because of the difference in the natural environment and plantations between the south and north, the types and amounts of agricultural products grown in each region also differ. Regarding underground resources, high-quality coal, bauxite, and iron ore are abundant in the north, while crude oil is confirmed to exist in the south. The improvement of traffic between the north and south regions is important for seamlessly connecting both regions and their markets, making the two regions complement each other, reducing their income difference, and promoting national economic growth. Therefore, it is critical to establish transport infrastructure to improve traffic between the north and south as well as surrounding areas.

In Vietnam, the share of road transport in passenger traffic is about 90%, and its share in cargo traffic is about 70%. Thus, road transport is still a major means of transport. However, in the total length of road network of about 240,000 km, the length of trunk lines is 40,000 km, which is only about 17% of the total, and the road network among cities, which is highly selective, is underdeveloped. In addition, because of the damage from the Vietnam War and insufficient road maintenance owing to budget constraints, the roads' transport functions are insufficient, and the level of services in cargo and passenger traffic is still low. As of 2007, the pavement proportions are 98% for national roads, 87% for provincial roads, 55% for local roads, and only 46% for rural roads. These statistics show the poor road conditions in the local living environment. As the number of registered vehicles rapidly increases with economic development, the insufficient road network becomes an obstacle to smooth flow of traffic. Moreover, Vietnam is at the early stage of establishing highways. National Highway No. 1 is a critical one that joins its northern border with China and Nam Can in the south across the country. However, the highway has yet to be constructed across the river between Can Tho and Ving Long; that part depends on ferry transport. It was a traffic bottleneck and unreliable in abnormal weather.

1.2 Project Outline

This project aims to improve the efficiency of logistics in the Mekong Delta region by constructing the Cuu Long (Can Tho) Bridge crossing the Hau River, a tributary of Mekong River and related approach roads in the South Vietnam, thereby contributing to strengthening of international competitiveness of and socio-economic development in the Mekong Delta.

<ODA Loan Project>

Loan Approved Amount/ Disbursed Amount	(Loan Approved Amount) National Highway No. 1 Bypass Road Construction Project: 8,393 million yen National Highway No. 1 Bypass Road Construction Project (II): 4,141 million yen Cuu Long (Can Tho) Bridge Construction Project: 24,847 million yen Cuu Long (Can Tho) Bridge Construction Project (II): 4,626 million yen	(Disbursed Amount) National Highway No. 1 Bypass Road Construction Project: 8,297 million yen National Highway No. 1 Bypass Road Construction Project (II): 3,996 million yen Cuu Long (Can Tho) Bridge Construction Project: 24,358 million yen Cuu Long (Can Tho) Bridge Construction Project (II): 3,952 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	(Exchange of Notes Date) National Highway No. 1 Bypass Road Construction Project: March 2001 National Highway No. 1 Bypass	(Loan Agreement Signing Date) National Highway No. 1 Bypass Road Construction Project: March 2001 National Highway No. 1 Bypass Road Construction Project (II): November

	Road Construction Project (II): October 2009 Cuu Long (Can Tho) Bridge Construction Project: March 2001 Cuu Long (Can Tho) Bridge Construction Project (II): March 2010	2009 Cuu Long (Can Tho) Bridge Construction Project: March 2001 Cuu Long (Can Tho) Bridge Construction Project (II): March 2010
Terms and Conditions	National Highway No. 1 Bypass Road Construction Project (L/A No. VNVIII-6)	
	Interest Rate	1.8%
	Repayment Period (Grace Period)	30 years 10 years)
	Conditions for Procurement	General untied
	National Highway No. 1 Bypass Road Construction Project (L/A No. VNVIII-6A)	
	Interest Rate	0.75%
	Repayment Period (Grace Period)	40 years 10 years)
	Conditions for Procurement	Tied between two countries
	National Highway No. 1 Bypass Road Construction Project (II) (L/A No. VNVIII-4)	
	Interest Rate	1.2%
Repayment Period (Grace Period)	30 years 10 years)	
Conditions for Procurement	General untied	
National Highway No. 1 Bypass Road Construction Project (II) (L/A No. VNVIII-4A)		
Interest Rate	0.01%	
Repayment Period (Grace Period)	30 years 10 years)	
Conditions for Procurement	General untied	
Cuu Long (Can Tho) Bridge Construction Project		
Interest Rate	0.95%	
Repayment Period (Grace Period)	40 years 10 years)	
Conditions for Procurement	Japan tied (Special Terms for Economic Partnership (STEP)), Consultant part: General untied	
Cuu Long (Can Tho) Bridge Construction Project (II)		
Interest Rate	0.2%	
Repayment Period (Grace Period)	40 years 10 years)	
Conditions for Procurement	Japan tied (Special Terms for Economic Partnership (STEP))	
Borrower / Executing Agency(ies)	Vietnamese government / Vietnam Ministry of Transport	
Project Completion	March 2010	
Target Area	Project site: Cuu Long (Can Tho) Bridge crossing the Hau River, a tributary of	

	the Mekong River and related approach roads Beneficiary area: Mekong Delta region
Main Contractor(s) (Over 1 billion yen)	National Highway No. 1 Bypass Road Construction Project: Thang Long Construction Corporation (Vietnam) / Civil Engineering Construction Corporation NO.8 (Vietnam) / Civil Engineering Construction Corporation NO.6 (CIENCO 6) (Vietnam), Quyet Tien Construction Investment Company (Vietnam) / Van Cuong Construction Union Company (Vietnam), China State Construction Engineering Corporation (People's Republic of China), Traffic Trade and Project Joint Stock Company (Vietnam) / Material Equipment and Civil Engineering JSC 624 (MECESCO624) (Vietnam) National Highway No. 1 Bypass Road Construction Project (II) : Thang Long Construction Corporation (Vietnam) / Civil Engineering Construction Corporation NO.8 (Vietnam) / Civil Engineering Construction Corporation NO.6 (CIENCO 6) (Vietnam) Cuu Long (Can Tho) Bridge Construction Project / Cuu Long (Can Tho) Bridge Construction Project (II): Taisei Corporation (Japan) / Kajima Corporation (Japan) / Nippon Steel Corporation (Japan)
Main Consultant(s) (Over 100 million yen)	Nippon Koei Co., Ltd. (Japan) / Chodai Co., Ltd. (Japan) (Note: in charge of all projects)
Related Studies (Feasibility Studies, etc.)	The basic design study on the Can Tho Bridge construction in the socialist republic of Vietnam (1997) The feasibility study on the Can Tho Bridge construction in the socialist republic of Vietnam (1998)
Related Projects	Yen loan: "National Highway No. 1 Bridge Rehabilitation Project" (January 1994; April 1995; March 1996), "Second National Highway No. 1 Bridge Rehabilitation Project" (March 1996; March 1997; March 1999), "Third National Highway No. 1 Bridge Rehabilitation Project" (March 2003) Technical Cooperation: "The Comprehensive Study on the Sustainable Development of Transport System in Vietnam (VITRANSS2)" (2007-2010), "Project for Capacity Enhancement in Construction Quality Assurance" (2010-2013), "The Project for Capacity Enhancement in Road Maintenance" (2011-2014), "The Project for Capacity Enhancement in Road Maintenance Phase 2" (2015-2018) Projects of other organizations: Asian Development Bank: Road parts of National Highway No. 1, "Lang Son – Hanoi," "Nya Trang – Quang Ngai," "Nha Trang – HCMC" World Bank: Road parts of National Highway No. 1, "Hanoi – Vinh," "Vinh – Dong Ha," "Quang Ngai – Dong Ha," "HCME – Can Tho," "Can Tho – Nam Can"

2. Outline of the Evaluation Study

2.1 External Evaluator

Ryujiro Sasao, IC Net Limited

2.2 Duration of Evaluation Study

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

Duration of the Study: October 2019 – November 2020

Duration of the Field Study: November 24, 2019 – December 22, 2019

2.3 Constraints during the Evaluation Study

In evaluating efficiency, the project cost was managed within the original plan, but information on tax, which is part of the cost, was not obtained. Although the sub-rating on the project cost may be ③ (High), it was regarded as ② (Fair) because a lack of information made it impossible to make accurate determination.

Although the expected second field trip was canceled because of the influence of COVID-19 infection and the evaluator was not able to visit Vietnam again, he communicated with the executing agency and JICA office by documents. In addition, the assistant researcher (local consultant) also conducted supplementary researches by telephone and e-mail communication and the evaluation team was able to obtain the minimum necessary information.

3. Results of the Evaluation (Overall Rating: B¹)

3.1 Relevance (Rating: ③²)

3.1.1 Consistency with the Development Plan of Vietnam

At the time of the appraisal, the Vietnamese government's *The 5 years Socio-Economic Development of Vietnam (2006–2010)* issued in 2006 prioritized the improvement of existing roads and new road construction. Thus, the improvement of National Highway No. 1, a major trunk road in Vietnam, had high priority. In addition, the *Study on the National Transport Development Strategy in the Socialist Republic of Vietnam* (July 2000), a development study by the Japan International Cooperation Agency (JICA), formulated the *National Transport Development Master Plan*. The plan includes a 10-year blueprint to give clear direction to the traffic system and services in order to develop the transport sector, conserve the environment, and promote integration with neighboring countries for globalization. In addition to infrastructure establishment, the plan seeks to strengthen the competitiveness of the transport sector, secure fairness³, minimize transport cost, and increase user satisfaction. For the blueprint, the plan estimates that the Vietnamese government would need to invest about US\$ 10.5 billion, in which the share of road-related investment accounts for 65% of the total.

At the time of the ex-post evaluation, the following policy documents were identified:

The 5 years Socio-Economic Development of Vietnam (2016–2020) published in 2016 informs the policy of extension of the highway system, emphasizing on investments in north–south highways and linkage among big cities in “4. Constructing infrastructure systems and urban areas” under “V. TASKS AND MAJOR SOLUTIONS” in PART 2 of the document.

The Prime Minister (PM)'s decision on strategy for Vietnam transportation development published in February 2013 states the importance of the development of a transport system in southern Vietnam, including the improvement and extension of National Highway No. 1, as “the development goal for 2020.”

The *PM's decision on construction planning of Mekong delta* published in January 2018 states the importance of continuing investment in addition to the existing transport infrastructure in order to strengthen the local transport system and the development of the Mekong Delta region. It also states the necessity of further extending National Highway No. 1 and of cross-sectional roads in the south area of the Hau River.

As mentioned above, there is no change in policies, or no drastic change in economic environment and social values, affecting the project's relevance. Therefore, there is strong conformity between the borrower country's development plans (before/after the project) and the purpose of the project subject to the evaluation.

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

² ③: High, ②: Fair, ①: Low

³ Fairness means “balanced development of the entire nation” and “support to the poor and the socially vulnerable.”

3.1.2 Consistency with the Development Needs of Vietnam

Can Tho City is located 167 km southwest of Ho Chi Min City and faces the Hau River, a tributary of the Mekong River. It is the most important city in the Mekong Delta region for collecting rice and other agricultural products. At the time of the appraisal, there was no bridge across the river, and transport by ferry between Ving Long Province and Can Tho City was a traffic bottleneck on National Highway No. 1. This necessitated the construction of a bypass road of National Highway No. 1 consisting of the bridge across the Hau River as well as approach roads. According to the executing agency and stakeholders, it took 30 minutes to move across the river by ferry, but, on average, more than 1½ hours in waiting. Citizens also unanimously claim that the ferry was risky during bad weather, indicating the need for a stable and rapid transport mode.

A comparison of the daily average traffic volume passing Can Tho before and after the project shows a rapid increase in volume after the bridge construction. This increase verifies the potential demand of the bridge (*see* section 3.3.1 Effectiveness). According to the statistics of the annual passenger and cargo traffic in Can Tho City, we see a steady increase in traffic amount even a few years after the opening of the bridge as follows.

Table 1: Trend of Annual Passenger Traffic and Cargo Traffic in Can Tho City

Item	2015	2018 (tentative)	Annual growth rate (%)
Passenger (thousand people)	10,560	13,309	8.0
Cargo (thousand ton)	2,899	3,485	6.3

Source: Can Tho City Statistical Yearbook 2018

In summary, the project is in conformity with both pre- and post-project development needs.

3.1.3 Consistency with Japan's ODA Policy

According to the country-wise assistance policy (of the then JBIC) at the time of the first appraisal of the Cuu Long (Can Tho) Bridge Construction Project, roads and bridges were emphasized as the subject of ODA Loan projects, because better transport infrastructure was essential to the economic development of Vietnam and had high priority in Vietnam's development plan. The Ministry of Foreign Affairs' *Country Assistance Program for Vietnam* formulated in 2000 recognized five subjects as important, of which one was development of infrastructure such as power and transport.

In the Ministry of Foreign Affairs' *Country Assistance Program for Vietnam* issued in July 2009 at the time of the second appraisal of the project, "Urban development, transport and traffic, and improvement of telecommunication network" was considered an important development subject. This program also prioritizes support for the "Establishment of network such as urban ring road, inner city roads and bypass roads around the cities" and "Establishment of trunk road network among cities" in order to cope with the increasing traffic demand, while JICA also lists in its *Country Assistance Implementation Report for Vietnam (April 2009)* "Urban development, transport and traffic, and improvement of telecommunication network" as important development subjects. The JICA report recognizes the establishment of a trunk traffic network as a major pillar to support development subjects.

The project suits the aims of the above Japanese governmental aid policies and is an example of concretization of the aims. Accordingly, the conformity between the project and Japan's aid policy is high.

Cuu Long (Can Tho) Bridge Construction Project is also a project belonging to the categories of special ODA Loans and STEP projects. The Can Tho bridge is one of the longest cable stayed bridges⁴ in Southeast Asia with mixed concrete and steel structure,

⁴ A cable-stayed bridge is a form of bridge that directly connects cables, which are stretched obliquely from one or

requiring advanced technologies to ensure quality and service of life. The executing agency states that Japan is one of the world's leading countries in bridge construction technology, especially of steel structure and, therefore, the application of Japanese technologies to the Can Tho Bridge as the special ODA Loan and STEP project was appropriate. Accordingly, the relevance of project is verified with regard to necessity and the merit of using Japanese technology as well.

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

3.2 Efficiency (Rating: ①)

3.2.1 Project Outputs

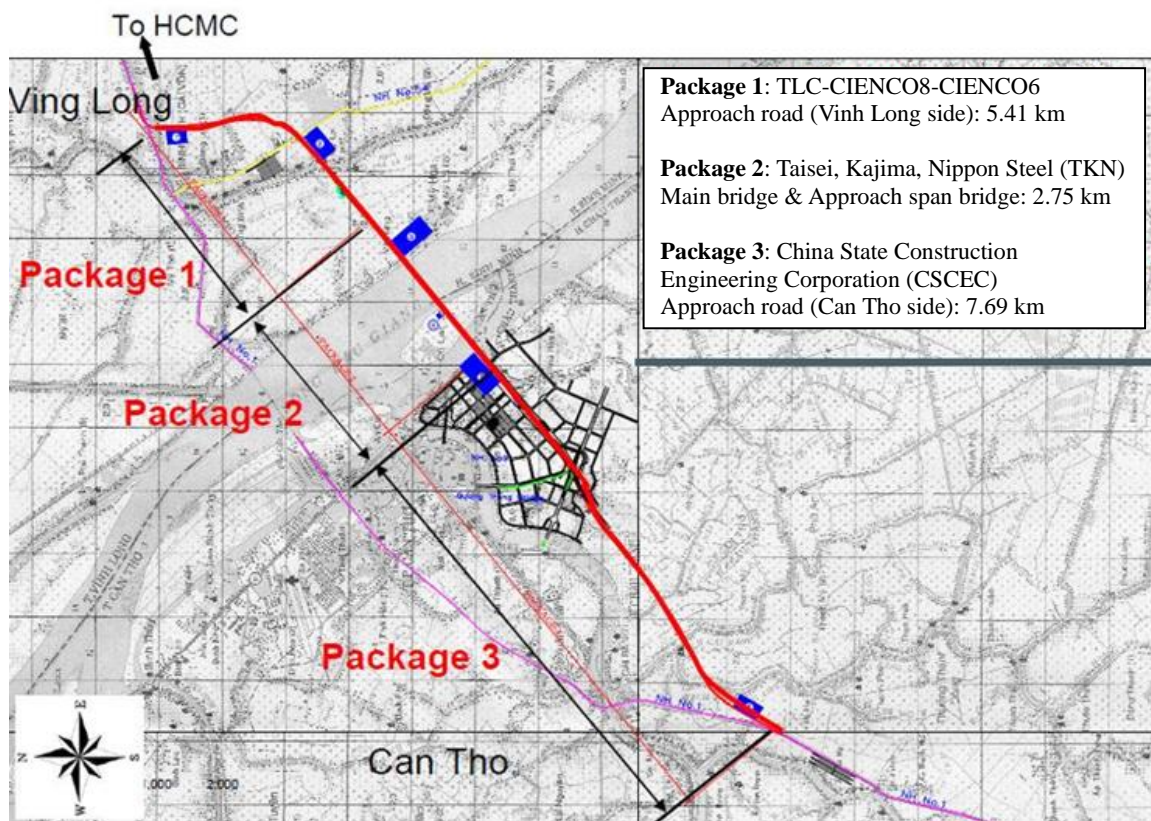
The following is a comparison between the plan and results of outputs of the project.

Table 2: Cuu Long (Can Tho) Bridge Construction Project

Item	Plan (At first appraisal)	Plan (At second appraisal)*	Results
1. Civil work	Hybrid (Steel and Prestressed Concrete) Cable bridge - Center span arrangement: 550 m - Length: 1,090 m - Foundation Type: Cast in place RC Pile of 100 m depth	Hybrid (Steel and Prestressed Concrete) Cable bridge - Center span arrangement: 550 m - Length: 1,010 m - Foundation Type: Cast in place RC Pile of 100 m depth	Hybrid (Steel and Prestressed Concrete) Cable bridge - Center span arrangement: 550 m - Length: 1,010 m - Foundation Type: Cast in place RC Pile of depth of 92 m (north) and 94 m (south on water)
	Approach span Bridge Vinh Long side (Connected PC-I Girder, length: 480 m)	Approach span Bridge Vinh Long side (Connected PC-I Girder, length: 520 m)	Approach span Bridge Vinh Long side (Connected PC-I Girder, length: 520 m)
	Approach span Bridge Can Tho side (Connected PC-I Girder, Connected PC Box-Girder, length: 1,180 m)	Approach span Bridge Can Tho side (Connected PC-I Girder, Connected PC Box-Girder, length: 1,220 m)	Approach span Bridge Can Tho side (Connected PC-I Girder, Connected PC Box-Girder, length: 1,220 m)
2. Equipment for administration	Inspection and maintenance vehicle: 1	Inspection and maintenance vehicle: 1	Inspection and maintenance vehicle: 1
Additional outputs	/	Countermeasure for settlement at north side Approach span Bridge (Vinh Long side)	Countermeasure for settlement at north side Approach span Bridge (Vinh Long side)
		Structure Health Monitoring System	Structure Health Monitoring System
			Additional countermeasure (piling) for settlement in north side Approach span Bridge, Vinh Long side

*Note: Additional loans were made for both sub-projects because the necessary cost had increased significantly from the original estimate, owing to the global increase in construction material prices and the change in amount and design change made in line with the site condition (soft ground).

more towers (also known as pylons), to the beam and supports it.



Map of the project site

Table 3: National Highway No. 1 Bypass Road Construction Project

Item	Plan (At first appraisal)	Plan (At second appraisal)	Results
1. Vinh Long side	Length: 5,410 m	Length: 5,410 m	Length: 5,410 m
	Minor bridges: 3	Minor bridges: 4	Minor bridges: 4
	Interchange: -Semi-Y Type (NH.1) -Diamond Type (NH.54)	Interchange: -Semi-Y Type (NH.1) -Diamond Type (NH.54)	Interchange: -Semi-Y Type (NH.1) -Diamond Type (NH.54)
	Service area: 21,000 m ²	Service area: 21,000 m ²	Service area: 21,000 m ²
2. Can Tho side	Length: 7,690 m	Length: 7,690 m	Length: 7,690 m
	Minor bridges: 7	Minor bridges: 7	Minor bridges: 9
	Interchange: -T-type Grade Intersection (NH.1), -Diamond Type (NH 91)	Interchange: -T-type Grade Intersection (NH.1), -Diamond Type (NH 91)	Interchange: -T-type Grade Intersection (NH.1), -Diamond Type (NH 91)
	Additional items	Flyover at interchange	Flyover at interchange
	Service area: 21,000 m ²	Service area: 21,000 m ²	Service area: 21,000 m ²
Toll gate: 1	Toll gate: 1	Toll gate: 1 (installed once but removed later because of suspension of toll collection)	

The change in the project scope from the original is minimal and mostly related to adjustments made with respect to the actual site condition; thus, the scope is not too different from the content at the time of the first appraisal. Most substantial changes in the scope are items added at the time of the second appraisal, such as “Countermeasure for soft ground at approach span bridge, Vinh Long side,” “Flyover at interchange at Can Tho side,” “Structure health monitoring system for the bridge structure,” and the following “Countermeasure (additional piling) for settlement in approach span bridge, Vinh Long side.”

The issue of soft ground at an approach span bridge was difficult to foresee and not accounted for in the original design. Therefore, a design change for piling to strengthen the ground and a budget increase for the change were inevitable. The flyover at the interchange at the Can Tho side was constructed owing to the rapid increase in traffic volume after the first appraisal. In addition, it was considered too early to introduce the structure health monitoring system for monitoring the bridge because of the status in Vietnam at the first appraisal. However, the state council later requested the installation of the system in order to conduct proper maintenance of the bridge and for securing smooth traffic. All the above changes strengthened the facility’s functions and contributed to the project’s purpose.

Incidentally, the executing agency’s evaluation of the contractors’ performance was especially high for Japanese enterprises in charge of the bridge⁵.

Table 4: Consulting Services

Item	Plan (At first appraisal)	Plan (At second appraisal)	Results
Details	<ul style="list-style-type: none"> • Review of Detailed Design (D/D) • Support for bidding and making contract • Construction management • Technical guidance • Environmental countermeasures 	<ul style="list-style-type: none"> • Review of Detailed Design (D/D) • Support for bidding and making contract • Construction management • Technical guidance • Environmental countermeasures 	<ul style="list-style-type: none"> • Review of Detailed Design (D/D) • Support for bidding and making contract • Construction management • Technical guidance • Environmental countermeasures

All the consulting services were conducted according to plan and were highly evaluated by the executing agency. Technical training (in Vietnam and abroad) was also conducted as per the originally planned subjects. In its evaluation, the executing agency noted that the trainees obtained much practical knowledge that was useful for their subsequent operation. Regarding the number of trainees, 20 people, as planned, participated in 10 days of training in Vietnam. In the case of training abroad, 29 people—higher than originally planned 15—participated in 2010 and 2011. This is owing to the increased demand for overseas training. Table 5 reports on the staff allocation (plan and actual) and reasons for the difference.

Table 5: Planned and Actual Person Months of Involved Personnel

Personnel	Plan	Actual	Reason for difference
Phase 1. Before construction			
Japanese experts	61	61	
Vietnamese experts	64	64	
Vietnamese support staff	64	109	More than originally expected number of staff were needed because of formulation of activity reports and design documents.
Phase 2. Construction			

⁵ The summary of interview to the executing agency is as follows. “Japanese contractors have high technical capability and conducted tasks properly in terms of assignment of work and systematic approach. Knowledge-wise, they have experience of building a big bridge like Can Tho bridge, which is suitable to the project. They supervised sub-contractors appropriately.”

Japanese experts	401	361	Micro adjustment of Person Month of each staff, based on the necessity of work, brought this total decrease.
Vietnamese experts	1,392	1,392	
Vietnamese supportive staff	694	694	

3.2.2 Project Inputs

3.2.2.1 Project Cost

The following are the budget and results by sub-project.

Cuu Long (Can Tho) Bridge Construction Project

Table 6: Budget of Project at First Appraisal

(Unit: million yen)

Item	Foreign currency		Local currency		Total	
	Total	Yen loan	Total	Yen loan	Total	Yen loan
Construction work	20,525	20,525	2,648	2,648	23,173	23,173
Price escalation	-	-	-	-	-	-
Physical contingency	1,027	999	132	0	1,159	999
Audit cost	8	8	0	0	8	8
Interest during construction	667	667	0	0	667	667
Commitment charge	-	-	-	-	-	-
Land acquisition	0	0	1,085	0	1,085	0
Administration cost	0	-	706	-	706	-
Tax and duty	0	-	2,434	-	2,434	-
Total	22,227	22,199	7,005	2,648	29,232	24,847

Conditions:

- Exchange rate: US\$ 1.00 = 108 yen, 1 Vietnam Dong = 0.00766 yen
- Price escalation rate: Foreign currency; 0.8%, Local currency; 0.1%
- Physical contingency rate: 5%, Cost estimated as of October 2000

Note: The consulting service fee of the two projects is integrated into the fee item of the National Highway No. 1 Bypass Road Construction Project, based on the request of the Vietnamese government, while the costs of land acquisition, compensation for the resettlement of residents, infrastructure establishment (for residents) and administration are all included only in this project.

Table 7: Results at the Time of the Ex-Post Evaluation

(Unit: million yen)

Item	Foreign currency		Local currency		Total	
	Total	Yen loan	Total	Yen loan	Total	Yen loan
Construction work	17,451	17,451	9,914	9,914	27,365	27,365
Price escalation	n.a. (Not Applicable)	n.a.	n.a.	n.a.	n.a.	n.a.
Physical contingency	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Audit cost*1	-	-	18	-	18	-
Interest during construction	905	905	-	-	905	905
Commitment charge	16	16	-	-	16	16
Service charge	24	24	-	-	24	24
Land acquisition	-	-	1,029	-	1,029	-
Administration cost	-	-	573	-	573	-
Tax and duty						
Total	18,397	18,397	11,533	9,913	29,931	28,310

Exchange rate: 1 Vietnamese Dong = 0.005690989 JPY (Applied to the non-loan portion of local currency, IFS average rate was used.)

*1: The originally planned audit to be shouldered by the Japanese side was dropped, and the Vietnamese side conducted it instead.

Note: The above data were compiled by the evaluation team from the original data provided by the executing agency. As the information was not available for tax, the cells are left blank. As the administration cost cannot be divided between two projects, the table shows the total amount including the road project.

National Highway No. 1 Bypass Road Construction Project

Table 8: Budget of Project at First Appraisal

(Unit: million yen)

Item	Foreign currency		Local currency		Total	
	Total	Yen loan	Total	Yen loan	Total	Yen loan
Construction work	3,467	3,467	2,978	2,673	6,445	6,140
Consulting service	1,775	1,775	0	0	1,775	1,775
Price escalation	-	-	-	-	-	-
Physical contingency	173	0	149	0	322	0
Interest during construction	270	270	208	208	478	478
Commitment charge	-	-	-	-	-	-
Land acquisition	-	-	-	-	-	-
Administration cost	-	-	-	-	-	-
Tax and duty	0	-	854	-	854	-
Total	5,685	5,512	4,189	2,881	9,874	8,393

Conditions

- Exchange rate: US\$ 1.00 = 108 yen, 1 Vietnam Dong = 0.00766 yen
- Price escalation rate: Foreign currency; 0.8%, Local currency; 0.1%
- Physical contingency rate: 5%, cost estimated as of October 2000

Note: The consulting service fee of the two projects (bridge and roads) is integrated into the fee item of the National Highway No. 1 Bypass Road Construction Project, based on the request of the Vietnamese government, while the costs for land acquisition, compensation for the resettlement of residents, infrastructure establishment for residents, and administration are all included in the Cuu Long (Can Tho) Bridge Construction Project.

Table 9: Results at the Time of the Ex-Post Evaluation

(Unit: million yen)

Item	Foreign currency		Local currency		Total	
	Total	Yen loan	Total	Yen loan	Total	Yen loan
Construction work	896	896	8,412	8,248	9,308	9,144
Consulting service	1,901	1,901	464	464	2,365	2,365
Structure Health Monitoring System	82	82	1	1	83	83
Price escalation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Physical contingency	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Interest during construction	682	682	-	-	682	682
Commitment charge	11	11	-	-	11	11
Service charge	9	9	-	-	9	9
Land acquisition	-	-	-	-	-	-
Administration cost	-	-	-	-	-	-
Tax and duty	-	-	-	-	-	-
Total	3,580	3,580	8,875	8,712	12,457	12,293

Exchange rate: 1 Vietnamese Dong = 0.005690989 JPY (Applied to the non-loan portion of local currency, IFS average rate was used.)

Note: The following data were summarized by the evaluation team from the original data provided by the executing agency. As the information was not available for tax, the cells are left blank.

In the project, the total budget was revised at the second appraisal. This is because for both sub-projects, the necessary cost had increased significantly compared with the original estimate, owing to the global increase in the prices of construction materials, change in the amount of material and design change made in line with the site condition (soft ground) (Additional loans were also made).

At the time of the ex-post evaluation, a comparison of the before (budget at first appraisal) and after (results) cost was conducted by adjusting (excluding from calculation) the additional scope. The details are as follows:

Before: Total budget 39,106 million yen (including 33,240 million yen of loan)
After: Total cost 42,388 million yen (including 40,604 million yen of loan)
After (After adjustment of added scope*): Total cost 38,908 million yen

* Details of the added scope are as follows.

1. Cost of installing a flyover at interchange (1,913 million yen)
2. Cost of introducing structure health monitoring (83 million yen)
3. Cost of the countermeasure for settlement (1,485 million yen)

Consequently, the rate of the actual (after the adjustment of added scope) against the original plan is 99%, and actual project cost is within the plan. However, the tax payment amount was not obtained⁶. Accordingly, the sub-rating of cost efficiency may be ③ (High), but was given ② (Fair) because information constraints made it impossible to make an accurate determination.

The cost was almost within the original plan because the increase in material prices was offset by a decrease in the yen amount owing to the appreciation of the yen in the foreign exchange rate. The price level of construction materials (governmental statistics) increased by 44% from 2005 to 2009, while the Japanese yen had appreciated by 32% between the first appraisal and the ex-post evaluation in the exchange rate against the Vietnamese dong.

3.2.2.2 Project Period

Table 10 reports the results of the comparison of the project period between the plan and the results.

Table 10: Plans and Results by Project Period

Stage	Plan/period (First appraisal)	Plan/period (Second appraisal)	Results
1. L/A Signing date	—	—	2001/3 (March 2001)
2. Selection of consultants	2001/1 – 2001/6	2001/4 – 2002/10*1	2001/4 – 2002/10*1
3. Selection of contractors	2001/7 – 2002/6	2003/3 – 2005/2	2003/3 – 2005/2
4. Construction	(Main bridge) 2002/6 – 2006/12 (Bypass road, Ving Long side) 2002/6 – 2006/4 (Bypass road, Can Tho side) 2002/6 – 2006/9	(Main bridge) 2005/2 – 2010/3 (Bypass road, Ving Long side) 2005/2 – 2009/10 (Bypass road, Can Tho side) 2005/2 – 2009/10	(Main bridge) 2005/2 – 2010/3*2 (Bypass road, Ving Long side) 2005/2 – 2009/10 (Bypass road, Can Tho side) 2005/2 – 2009/10
5. Land acquisition and resettlement of residents	2000/4 – 2001/7	2002/2 – 2006/8	2002/2 – 2006/8

*1. Source: JICA document

*2. Source: “Final Construction Report” This is the period of construction of main part. Later “Additional countermeasure (piling) for settlement in Approach span Bridge, north side” was implemented. This countermeasure was completed in July 2016.

The following are the analysis results of delay factors.

Table 11: Analysis of Delay Factors

Stage	Planned period (First appraisal)	Results	Main delay factors
1.L/A Signing date	—	March 2001	—
2.Selection of consultants	6 months	1 year and 7 months	Details unknown
3.Selection of contractors	12 months	2 years	Details unknown
4.Construction	(Main bridge) 4 years and 7 months	5 years and 2 months	Suspension of construction work caused by collapse of tentative piers
	(Bypass road, Ving Long side)	4 years and 9 months	Countermeasure for settlement, increase of construction materials prices and financial problem of
	3 years and 11 months		

⁶ The total of originally expected tax amount is 3,288 million yen as the total of two projects and this amount exceeds the difference of planned total cost and actual total cost, 198 million yen.

	(Bypass road, Can Tho side) 4 years and 4 months	4 years and 9 months	contractors and so on Countermeasure for settlement, increase of construction materials prices and replacement of contractors and so on
2. Land acquisition and resettlement of residents	1 year and 4 months	4 years and 7 months	According to the executing agency, it may have taken time to establish infrastructure for the resettlement site, as resettlement negotiation itself did not take much time. However, the delay described in the left column did not affect progress of construction, because the land acquisition took place much earlier than the start of construction.

The planned project period and actual period were compared, and the details are shown below.

Plan: March 2001-December 2006 (70 months) Actual: March 2001-March 2010 (109 months) ⁷

Consequently, the ratio of the actual period to planned period is 156%, that is, the actual project period was significantly longer than planned. Therefore, the sub-rating of time efficiency is ① (Low).

The accidental collapse of the piers at the Cuu Long Bridge affected time efficiency; had the accident not occurred, the construction period would have been reduced by about one year. The total project period without the delay from the accident is estimated to be 97 months, and the rate of the actual project period divided by the planned period would have improved from 156% to 139%.

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

In this project, the constructed road stopped charging a toll against the original plan. Accordingly, the calculation of the financial internal rate of return (FIRR) was suspended, and only the EIRR was re-calculated.

The EIRR of this project was calculated to be 12.5% in the first appraisal and 15.7% in the second appraisal. Re-calculation at the ex-post evaluation was based on the method used at the first appraisal (F/S) and at the second appraisal. The following table shows the comparison between the appraisals and the ex-post evaluation. EIRR at the time of ex-post evaluation increased from the figure at the time of second appraisal by 2 % mainly because of the re-confirmed increase of benefit from the estimate as at second appraisal.

Table 12: Economic Internal Rate of Return (EIRR)

	Appraisal	Re-calculation at ex-post evaluation
EIRR	First appraisal: 12.5% Second appraisal: 15.7%	17.7%
(Calculation background)		
Project life	50 years	50 years

⁷ As stated in the report (footnote of Table 10), to be precise, the entire construction work finished in July 2016. However, the road started to be used after the completion of the main part in 2010 and traffic volume smoothly increased. Accordingly, the end of project period was recognized to be the end of the main part in judging the efficiency.

Cost	Project cost (except for tax), Operation and maintenance fee	Project cost (except for tax), Operation and maintenance fee
Benefit	Saving of running cost (including the operation cost of ferry service), reduction of transport time and increase of land prices	Saving of running cost (including the operation cost of ferry service), reduction of transport time and increase of land prices

In summary, the efficiency of the project is low because of uncertainty about the obtained cost information and that the project period significantly exceeded the plan.

3.3 Effectiveness and Impacts⁸ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Table 13 reports the targets and results of the operation and effect indicators of the project.

Table 13: Target and Actual Values of Operation and Effect Indicators

Indicators	Baseline	Target	Actual	
	2008	2012	2012	2019
		2 years after the completion	2 years after the completion	9 years after the completion
Annual average daily traffic volume (units/day)	27,110	62,102	71,808	57,917
Reduction in travel time (million yen/year) (Note 1)	-	436	Achieved	
Passenger car units (PCU/day) (Note 2)	20,797	52,393	41,288	47,873
Reduction in ferry operating costs (million yen/year)	-	342	Achieved	
Rise in land value in neighborhood	As this item is suitable as “impact” level indicator, it is discussed at “impact.”			

(Note 1) This assumes that transport time will be reduced by 25 minutes as a result of the implementation of two sub-projects.

(Note 2) Passenger Car Unit (PCU) is a unit converting the number of a range of transportation vehicles into the number of passenger cars. In principle, we use the conversion parameters used at the baseline for re-calculation.

The analysis for each indicator is shown below.

1. The annual average daily traffic volume (AADT): It is the number of vehicles that pass the bridge in a certain period. The annual average traffic volume of two years after the completion clearly exceeds the original target (The realization rate is 115.6%).

The increase in traffic volume slowed for several years after the opening of the bridge because of a shift of transport to other routes owing to the opening of the new ferry route and roads across the Hau River after opening of Can Tho Bridge. Among the four new traffic routes shown below, we were able to obtain the estimate of the annual average daily traffic volume of only Dai Ngai Ferry service. This traffic amount in 2019 was 7,100 (about 12% of AADT at the Can Tho Bridge in 2019); consequently, the total traffic volume of four routes would be significant.

⁸ Sub-rating for Effectiveness is to be put with consideration of Impacts.

Table 14: Ferry Routes and Roads across Hau River after Opening of Can Tho Bridge

Bridge and ferry	Year of opening or starting service	Distance from Can Tho bridge
National Highway No N2	2011	75 km
Dai Ngai Ferry	2013	54 km
Cao Lanh Bridge	2018	73 km
Vam Cong Bridge	2019	64 km

Source: Executing Agency

On the other hand, plural industrial estates have been opened around the opening time of the Can Tho Bridge. This seems to be a factor leading to the increase in transport of cargo including final products and raw material, and an increase in traffic.

Table 15: Status of Opening of Industrial Estates in Vicinity of Can Tho Bridge

Name	Location	Opening year	Distance from Can Tho bridge
Hung Phu 2A	Phu Thu Ward, Cai Rang District	2009	10 km
Hung Phu 2B	Phu Thu Ward, Cai Rang District	2009	10 km
Thot Not	Thoi Thuan Ward, Thot Not District	2009	59 km
North O Mon	Thoi Long Ward, O Mon District	2011	40 km

Source: CEPIZA (Cantho Export Processing and Industrial Zone Authority)

In summary, there seem to exist the following factors of both suppression and acceleration related to the traffic increase.

- Suppression factor: There was a major shift in traffic volume because of the start of new ferry service and opening of roads in the neighborhood of the Can Tho Bridge after its opening.
- Acceleration factor: Plural industrial estates were opened in the neighborhood of the Can Tho Bridge around its opening time.

The opening of alternative traffic routes in and after 2011 and the opening of industrial estates mainly up to 2011 explain why the suppression factor seems to have been more influential in recent times.

2. The reduction in travel time: It is an indicator referring to the total benefit of saving transport time compared with the case of passing along National Highway No.1 by crossing the river (by the ferry service). Because the calculation details of the indicator shown in the ex-ante evaluation sheet were not available, precise re-calculation is impossible. However, as the most important parameter in the re-calculation—increase of traffic volume—was realized as planned, it is fair to say that the target indicator was achieved. The originally estimated saving time in calculating the target was 25 minutes. According to the executing agency, the passing time by the ferry was about 30 minutes and the actual passing time though the Can Tho Bridge was 2 minutes and 51 seconds (average of the two times measured by the evaluator). Therefore, the original estimate of the saving time is appropriate. Because travelers can save the waiting time to use the ferry (about 1.5 hours on average) in addition to the passing time reduction, the time-saving effect would be more than the target.

3. The passenger car units: This is the unit in which the number of various vehicles is converted into the one of passenger vehicles. This does not indicate the originally expected growth (The realization rate is 78.8%), but it is explained by the fact that the number of motorbikes whose conversion parameter is the smallest was more than that of other vehicles in 2012.

4. The reduction in ferry operating costs: With regard to this indicator, the basis for calculating the 2012 target value indicated in the ex-ante evaluation table was not available.

However, in re-calculating this indicator based on the expected saving effect right after the bridge opening stated in the F/S report, the amount was about 315 million yen per year, which is slightly lower than the original target of 342 million yen. Because the estimated saving effect of ferry operation at the F/S seems to be close to reality, and the estimated traffic volume up to 2010 on the assumption that this project was not implemented is close to the actual volume, we conclude that the originally expected effect is realized.

3.3.1.2 Qualitative Effects (Other Effects)

There are no originally expected items, and the qualitative effect was summarized in the item of “impact” in the ex-post evaluation.

3.3.2 Impacts

3.3.2.1 Intended Impacts

Impact is usually defined as an effect that appears several years after project completion. Concrete indicators on impact did not exist in the ex-ante evaluation sheet. Therefore, based on the key point of this project, we newly defined impact as “contribution to socio-economic development of the Mekong Delta region through strengthening of international competitiveness and improvement of the living environment,” established concrete indicators, and measured them accordingly. Regarding the quantitative effect, an impact similar to the national average, or more, has been realized in most economic indicators. Although it is difficult to verify the cause–effect relationship between the project and items of impact, there is a strong relationship between the increase in traffic volume and increasing scale of economy in general. When we consider the above effect indicators as well, as expected in the original scenario, there is good possibility that an improvement in transport modes increased traffic, which, in turn, activated the local economy.

1) Quantitative effect (Increase in international competitiveness of industrial goods produced in the Mekong Delta region)

The increase in international competitiveness of the Mekong Delta region can be verified by comparing the statistics of region-wise exports, but such statistics are not available. Accordingly, we obtained alternative data such as region-wise industrial output and direct foreign investment.

Regarding industrial output, Table 16 shows that the growth rates of Vinh Long Province and Can Tho City exceed the national average of Vietnam from 2010 to 2016.

Table 16: Trend in Industrial Outputs

(Unit: The figures between 2012 and 2016 are indexes with those in 2010 as 100. The figures of 2017 and 2018 are indexes with those in 2015 as 100.)

Region \ Year	2012	2013	2014	2015	2016	2017	2018*2
1. Vinh Long Province*1	102.1	112.0	109.8	111.6	111.3	109.1	109.6
2. Can Tho City*1	104.6	107.7	108.2	107.3	108.8	107.2	107.8
3. Whole Vietnam*1	105.8	105.9	107.6	109.8	107.4	111.3	110.1

*1. Source: HP of Vietnam Statistics Office, https://www.gso.gov.vn/default_en.aspx?tabid=776

*2. Tentative figures

Regarding foreign direct investment, Table 17 shows that before and after 2010, the ratios of increase in Vinh Long Province and Can Tho City exceed the national average of Vietnam. The increases in direct investment and trend of enterprises also conform with the results of the interviews with enterprises that began operating in the industrial estates (For an example, one enterprise decided to participate in the estate after knowing of this project).⁹

⁹ The most important benefit from the bridge construction is the reduction of time to travel to Ho Chi Minh City according to the interviews of enterprises located in the industrial estate in Can Tho City. This is related more to the improved operation efficiency and increase in production than a decrease in transport cost.

Table 17: Trend in Foreign Direct Investment Amounts

(Unit is index with the average amount of registered capital from 2007 to 2010 as 100)

region \ year	2011	2012	2013	2014	2015	2016	2017	2018	Accumulation of invested amount (2011-2018)
1.Ving Long Province*1	41	220	27	299	552	1,305	1,124	1,472	5,040
2.Can Tho City*2	368	25	23	108	59	693	26	35	1,337
3.Entire Vietnam*3	46	48	66	64	71	79	109	107	590

*1. Source: Ving Long Province Statistical Yearbook 2018

*2. Source: Can Tho City Statistical Yearbook 2018

*3. Source: HP of Vietnam Statistics Office, https://www.gso.gov.vn/default_en.aspx?tabid=776

2) Quantitative impact (Contribution to socio-economic development by improving the living environment)

The tables below show trends in GDP, number of enterprises, and the income of residents of entire Vietnam, Ving Long Province, and Can Tho City. We find evidence of development in economic aspects after the completion of the project.

As per Table 18, although the GDP data before 2015 were not available for Can Tho City, both Ving Long Province and Can Tho City show increasing trends over time.

Table 18: Trend in GDP (Unit: 1 billion Vietnamese Dong at constant 2010 price)

region \ year	2010	2011	2012	2013	2014	2015	2016	2017	2018
1.Ving Long Province*1	21,535	23,333	24,827	26,457	28,227	30,241	31,784	31,043	32,863
2.Can Tho City*2	n.a.	n.a.	n.a.	n.a.	n.a.	49,182	53,431	56,928	60,923
3.Entire Vietnam*3	2,157,828	2,292,483	2,412,778	2,543,596	2,695,796	2,875,856	3,054,470	3,262,547	n.a.

*1. Source: Ving Long Province Statistical Yearbook 2015, 2018

*2. Source: Can Tho City Statistical Yearbook 2016, 2018

*3. Source: HP of Vietnam Statistics Office, https://www.gso.gov.vn/default_en.aspx?tabid=776

In Table 19, the numbers of enterprises in Ving Long Province and Can Tho City increased steadily from 2010 to 2017 by 14% and 46%, respectively.

Table 19: Trend in Numbers of Enterprises in Operation (Manufacturing Sector)

Region \ Year	2010	2011	2012	2013	2014	2015	2016	2017
1.Ving Long Province*1	295	321	314	306	305	307	314	335
2.Can Tho City*2	665	n.a.	721	678	723	764	865	973

*1. Source: Ving Long Province Statistical Yearbook 2015, 2018

*2. Source: Can Tho City Statistical Yearbook 2016, 2018

In Table 20, the income of residents (average monthly salary per capita) increased in Ving Long Province by about 90% and in Can Tho City by about 120% from 2010 to 2016. However, these growth ratios are similar to those of the Mekong Delta region and the entire Vietnam.

Table 20: Trend in Average Monthly Salary per Capita
(Unit: Thousand Vietnamese Dong)

region \ year	2010	2012	2014	2016	2018*
1.Ving Long Province	1,239	1,744	2,205	2,378	3,089
2.Can Tho City	1,540	2,325	2,673	3,365	4,371
3.Mekong Delta	1,247	1,797	2,327	2,778	3,588
4.Entire Vietnam	1,387	2,000	2,637	3,098	n.a.

Source: Website of Vietnam Statistics Office, https://www.gso.gov.vn/default_en.aspx?tabid=776

*Note: Tentative figures

Land prices also increased in the vicinity of the project site according to field research (interviews with real estate companies and research of related websites on the Internet), as shown in Table 21 (We adopted the average figures of plural information data).

Table 21: Trend in Land Prices

Indicator	Baseline (Actual at 2008)	Target (2012, 2 years after the completion)	Actual (2012, 2 years after the completion)	Actual (2019, 9 years after the completion)
Index of increase of the price of land in vicinity (the figure of 2006 as 100)	165	450	333 (Urban area, Can Tho), 338 (Urban area, Ving Long)	1,333 (Urban area, Can Tho), 1,500 (Urban area, Ving Long)

At the point of two years after project completion, the average land price increased 3.3 times the figure of 2006, which is slightly lower than the forecast of 4.5 times. However, the land price increased drastically in the years after 2012.

3) Qualitative impact (Contribution to socio-economic development by improving the living environment)

1. Impact of establishing the bridge and roads (Interviews with local government and residents)

The results of interviews with the chairpersons of the People’s Committees in Ving Long and Can Tho, the sites of the bridge and roads, are shown below. Regarding the benefit from the project, both representatives mention strong benefit such as reduction of passing time, convenience (that is, travelers are not constrained by factors such as departure times of the ferry service), decrease of influence of bad weather, improved traffic access to many places, and more benefits to commercial establishments near the project site. Further, they state that materials can be brought in from and taken to farther regions. They also mention no negative influences.

Regarding local residents, three households close to the project site and two households living 1–1.5 km away from both sides of the bridge (Ving Long and Can Tho) were also interviewed as samples. The summary of interviews is as follows:

- All ten respondents from the ten households mention high benefits such as reduction of passing time, convenience, less influence of bad weather, and improved traffic access to many places. Nine households obtained opportunities of new employment and business as a result of the project.
- Most opinions were “no particular change” regarding the influence on the environment at both sides of the bridge, but there were minor opinions that the quality of air and noise worsened¹⁰.

¹⁰ The executing agency did not hear any particular complaints from local residents either during the completion or after.

- Eight out of ten households replied that the AIDS prevention program was effective.
- All households were satisfied with the operation and maintenance of roads.
- Regarding the total project evaluation of five grades¹¹, five households responded “Excellent” and another five households responded “Good” (There was no difference between the two sides).

2. Impact of establishment of the bridge and roads (Interviews with enterprises)

Regarding enterprises, we interviewed three operating in the industrial estates near the project site and four near the project site.

- All seven enterprises mentioned high benefits such as reduction of passing time, convenience, reduction of influence of bad weather, and improved traffic access to many places.
- All enterprises reported increasing trends of sales and stable profits in their business performance. One enterprise (Japanese) in an industrial estate mentioned that it decided to operate there because of the project and that their business is fully dependent on the Can Tho Bridge.
- Regarding the total project evaluation of five grades same as above, six enterprises responded “Excellent” and one enterprise responded “Good.”

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Natural Environment

This project belongs to Category A, as it is a road sector project according to “JBIC Guideline for the purpose of environment consideration in ODA Loans” (issued in October 1999).

From 2005 to 2011, the executing agency conducted monthly environment monitoring. The items of monitoring are quality of air, quality of water, noise, and vibration. Table 22 presents the monitoring method and results.

Table 22: Environment Monitoring Method and Results

Item	Method	Results
Air quality	To collect 3 samples at one place per day (Total 3 days at 3 places)	Parameters of dust, CH and SO ² were over the limit of Vietnamese Standard in 2005 and 2006 but had lessened to the level within the national standard.
Water quality	Underground water: to collect one sample at one place River water: to collect two samples at a place (total 6 places)	Underground water was not particularly affected by the construction works. Impact on the river water (of the Hau River) was also subtle (As at December 2019, there was not much change from the baseline and majority items out of 14 satisfied national standard).
Noise	Measurement of 24 times per place (total 3 places)	Figures slightly increased after construction works but they are not at the level affecting people.
Vibration	Measurement of 24 times per place (total 3 places)	Figures slightly increased after construction works but they are not at the level affecting people.

Considering the above results, no special countermeasures for environment conservation were taken. With regard to any change in the environment as a whole, the director of the health management center (clinic) in charge of the district, including the project site, also recognizes no problematic change. She states that she has received no health complaints from residents. Regarding noise and vibration, the evaluator believes they are not at serious levels, based on his stay at the project site on several days for total several hours.

¹¹ *5: Excellent, 4: Good, 3: Medium, 2: Poor, 1: Very poor

2) Resettlement and Land Acquisition

The evaluator visited the headquarters of the executing agency and two district people's committees (of Ving Long and Can Tho) that were in charge of the resettlement of residents. The evaluator confirms the following content about the outline of the resettlement and land acquisition, as reported in the appraisal document *Can Tho bridge Cuu Long (Can Tho) Bridge Construction Project II* issued on March 5, 2010.¹²

“About 210 ha of land acquisition was conducted with the resettlement of 1,574 households. Procedure on land acquisition and compensation was realized in line with domestic law of Vietnam.”

The results of the interviews on resettlement of residents are shown below. Two district people's committees (Can Tho and Ving Long) in charge of the resettlement adopted the following comprehensive compensation measures according to the governmental decrees.¹³

1. Compensation for land that is acquired for the project (For residential land: compensation by provision of alternative land or monetary compensation; for agricultural land: monetary compensation)
2. Monetary compensation for removed properties including houses and structures
3. Tentative support for living, monetary support of an equivalent to 30 kg of rice
4. Support for expenditure in training to find work in a non-agriculture field

In addition, two committees established basic infrastructure (water, electricity, and roads) at the site of resettlement.

Interviews at three places introduced by the executing agency show that most relocated residents had already moved, with only a few households remaining at the site (There is no list of relocated residents). Consequently, the evaluator was able to conduct interviews with ten households. The results are summarized as follows.

- The interviewees are not satisfied with the monetary compensation for resettlement.
- The standard of living of most interviewees decreased because they cannot practice agriculture and their continuous source of income was lost.
- Life infrastructure such as water, electricity, and roads of some places was not well established in the beginning (at the Can Tho side).

According to the staff of the people's committees who were in charge of resettlement and still remain in the committees, the amount of monetary compensation was to be sufficient enough to purchase new land for agriculture after resettlement. However, the site visit to Can Tho gave reason to believe that the problem of life infrastructure was a fact. For example, the roads and drainage in parts of the resettlement sites were not well established at the time of the site visit.

3) Other impacts

(HIV/AIDS prevention program)

According to the report of Mid-Term Review conducted during project implementation (issued in June 2006), the executing agency held the HIV/AIDS prevention program for two years from February 2006 to January 2008 with the support of Care International, an NGO.

¹² There was no resettlement of residents related to the countermeasures taken against land settlement at the approach span bridge of the north side.

¹³ 1) Decree of Government No. 22/1998/ND-CP dated April 24, 1998 on compensations for damage when the state recovers land for use in purposes of national defense, security, national interests and public interests and 2) Decree of Government No. 197/2004/ND-CP dated December 3, 2004 on compensation, support and resettlement when land is recovered by the State

The content included workshops, education, and publicity activities for about 800 laborers and residents of the community near the project site. The evaluator was unable to confirm more details with the executing agency because more than 10 years had passed. The executing agency did state that the program was effective, especially because construction laborers tend to have low awareness of HIV/AIDS.

We visited the health management center in charge of the district, including the project site in Can Tho City, for an interview. The head of the center stated that, although it is difficult to verify the effect of the program scientifically, the number of HIV-infected people would have increased had the program not been implemented.

(Other considerations to the people affected by the project)

- The people who made a living through commercial services, including vendors, to ferry passengers may have moved to another ferry port.
- Of the 300 employees of the ferry company, 200 were employed by the O&M company of the bridge and 100 were recruited by another ferry company after project completion.
- Because the Can Tho Bridge and approach roads became a part of the highway, pedestrians and bicycles cannot pass the bridge. Accordingly, a new ferry service for the local residents was introduced at a point 4 km away from the Can Tho Bridge, in line with their demands.

In conclusion, this project has achieved its objectives, indicating high effectiveness and impact.

3.4 Sustainability (Rating: ③)

3.4.1 Institutional/Organizational Aspect of Operation and Maintenance

In March 2010, the O&M company, also called the Can Tho Bridge Joint Stock Company, was established as a state company by the Ministry of Transport (MOT) of Vietnam. The main task of the company is to operate and maintain the main bridge at Can Tho and the National Highway No. 1 approach roads. It has 89 staff members. The company became a subsidiary of the executing agency, CUU LONG CIPM (CUU LONG Corporation for Investment, Development and Project Management of Transportation Infrastructure) in July 2011. CUU LONG CIPM had been a department of the MOT (PMUMT), but became a state company under the MOT in 2011.

The O&M company conducted the operation and maintenance of the Can Tho Bridge from 2010 to 2015 under a consignment contract (negotiated contract) with the fourth local road management unit in VRA (Vietnam Road Administration), MOT. From 2015 to 2019, the company continued operation and maintenance after winning a competitive bidding. Therefore, the operation and maintenance of the project facilities are not necessarily undertaken by the same company, indicating the weak stability of the company in charge; the operation and maintenance under such arrangement may be slightly less stable than one under a fixed government agency. However, the main organization in charge is VRA; owing to its routine monitoring, there is no concern regarding operation and maintenance.

Under the board of directors, the O&M company consists of five departments: planning and technical department, equipment and supply department, quality control department, labor safety department, and operation and maintenance department. The operation and maintenance department consists of the Main Bridge Maintenance Team, Approach Road & Bridge Maintenance Team, and Electricity & Landscape Maintenance Team, with 20, 21, and 12 staff members, respectively. The number of staff members is sufficient and there is no problem in conducting tasks. The turnover ratio is small, except for mandatory retirement; overall, the staff structure is stable.

In summary, there is no problem of institutional or organizational sustainability.

3.4.2 Technical Aspect of Operation and Maintenance

The following operation and maintenance tasks are conducted.

Table 23: Operation and Maintenance of Project Facilities

Facilities	Responsible organization	Operation and maintenance activities
1.Main bridge	Main Bridge Maintenance Team	- Repair of physical damage and defect of the bridge - Structure health monitoring - Monitoring by patrol (Attention to fire and traffic accidents)
2.Approach roads	Approach Road & Bridge Maintenance Team	- Repair of physical damage and defect of the roads
3.Electricity system	Electricity & Landscape Maintenance Team	- Monitoring of function of power generation facility and fire prevention facilities

The following three manuals are used in conducting operations:

1. The Manual for Maintenance Works (made by the Can Tho bridge contractor)
2. The Manual for Monitoring System for Health of The Bridge Structure (made by NTT Data corporation)
3. The Manual on Management, Operation & Maintenance of Can Tho Bridge issued under the decision No. 1467/QD-BGTVT (made by MOT)

According to the executing agency, there is no technical problem in the operation and maintenance of the bridge or roads under this project, or in the staff's technical level. The road engineer, as the national expert supporting the external evaluator, conducted interviews with core staff in charge of operation and maintenance. The engineer confirms the staff's high technical level and knowledge.¹⁴ In fact, these staff members are supervised by team leaders with professional experience of 25–30 years; the assigned staff members are all experienced and certified engineers (Bachelor of engineering). In addition, the O&M company conducts training in subjects such as “Management of O&M and construction,” “Supervising for O&M,” and “Occupational Health and Safety” using the teaching materials provided by the government.

In summary, there is no problem in technical sustainability.

3.4.3 Financial Aspect of Operation and Maintenance

In 2012, the Government of Vietnam established a Road Maintenance Fund. The fees for operation and maintenance of roads are collected annually for all motorized vehicles in order to finance the fund. All vehicle holders are required to annually pay these fees at the time of car registration (e.g., 1,560,000 Vietnam dong, or 7,400 yen, per unit for a passenger vehicle). This also meant that the tolls for highways constructed by government funds were abolished. Thus, the toll booth of the Can Tho Bridge stopped its operation on February 3, 2013. Table 24 shows the results of the toll collection.

Table 24: Results of Toll Collection

Fiscal year	Collected amount (Vietnamese Dong)
2010 (Sept. – Dec.)	23,301,825,000
2011	78,576,484,000
2012	80,614,135,000
2013 (until Feb.)	6,886,222,834

¹⁴ The engineer asked about the understanding about the project, knowledge of operation and maintenance, current situation of structures, recording of maintenance activities, recognition about the necessity of training and capacity development.

The O&M company furnishes the operation and maintenance budget based on the actual needs and the instructions in the Manual on Management, Operation & Maintenance of Can Tho Bridge issued under decision No. 1467/QD-BGTVT. The budget is appraised by the fourth local road management unit in VRA and, thereafter, approved by VRA. This way, the required amount to operate and maintain the bridge and approach roads is secured. The budget is furnished for three financial years at once, with annual adjustments for inflation. Table 25 reports the budget for and after 2010 (The actual expenses seem to be close to the budget according to the executing agency).

Table 25: Operation and Maintenance Budget

Fiscal year	Operation and maintenance budget (Vietnamese Dong)
2010	7,381,818,182
2011	18,000,000,000
2012	19,797,681,747
2013	19,771,548,446
2014	19,978,000,019
2015	18,003,564,118
2016	18,866,388,918
2017	19,800,939,272
2018	19,157,012,531

In summary, the project's financial sustainability is stable.

3.4.4 Status of Operation and Maintenance

Major parts of the facilities inspected are as follows.

The main span: The foundation part cannot be observed as it is underground. However, there are no defects in the main pylons, bridge girders, bridge deck, and parapet. The lighting system is in good condition and traffic signs are properly equipped.

Approach spans: The foundation cannot be observed. However, according to the executing agency, the project required additional piling in 2013 to strengthen the piers. Then, monitoring of the settlement of piers was conducted as a security measure to the end of the warranty period (one year after the end of construction completion). However, there is no abnormality, and the settlement seems to have stopped. There is no deterioration of abutments and piers, and no defect in the bridge deck and parapet. The lighting system is in good condition and traffic signs are properly equipped.

Approach roads: Deterioration of some road surfaces was observed (e.g., cracking and pothole), but this defect was reportedly fixed after the first site field survey.

Bridge monitoring system (structure health monitoring): In this system, any abnormality in data of three kinds on the following is monitored 24 hours a day: displacement of structure; rainfall, air temperature, and temperature of structure; and situation of road traffic of bridge and approach roads (monitored by cameras). Regarding the displacement of structure, there was a defect in the software to process the received data and it was not in operation at the time of the site visit. As stated above, the conditions of the facilities are good in general, except for the bridge monitoring system; there is no problem obtaining spare parts either.

In conclusion, no major problems have been observed in the institutional/organizational, technical, and financial sustainability of the project. The current status of the operation and maintenance system is also sound. Therefore, the overall sustainability is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aims to improve the efficiency of logistics in the Mekong Delta region by constructing the Cuu Long (Can Tho) Bridge crossing the Hau River, a tributary of Mekong River and related approach roads in the South Vietnam.

Its implementation fully matches the Vietnamese government's development plan, needs and Japan's ODA policy to Vietnam, indicating the project's high relevance. The project budget was revised because of the global rise in prices of construction materials after the first appraisal and the changes in the extent and design of the construction in line with the site condition (soft ground). Further, the tentative piers of the bridge collapsed. Nevertheless, the bridge was constructed successfully and the number of vehicles that pass the bridge significantly increased after the completion of the project. In addition, local residents are not required to wait for ferry departure times anymore and the bridge offers many concrete benefits such as reduced travel time, decreased influence of bad weather, and improved traffic access to many places. Furthermore, socio-economic statistics seem to indicate the realization of an impact brought by the project. Accordingly, we find that both effectiveness and impacts have reached the originally expected level. However, the project's efficiency is low, because the project cost could not be confirmed for a lack of information, and the actual project duration exceeded the planned one significantly. The operation and maintenance of this project has no particular problem in its institutional/organizational, technical, and financial aspects. The sustainability of the project's effects is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Improvement of the bridge monitoring system: There exists a facility to conduct 24-hours-a-day monitoring at the Can Tho side. At the time of the site visit, there was a defect in the software that processes received data on displacement of the structure observed within the monitoring system. This problem has been unsolved for several months. Owing to the monitoring's critical nature in maintaining bridge functions, VRA should either fix or replace the software promptly.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Monitoring of the structure during construction: Although the accident was not foreseeable, the collapse of the tentative piers led to many casualties. As proposed in the "Proposals to prevent the repetition of the accidents and points of improvement of project supervision of ODA Loans¹⁵" made by the Ministry of Foreign Affairs' Special Committee for the prevention of repetition of accidents of Can Tho bridge, we recommend monitoring the quality of both tentative and final structures to prevent similar accidents in the future. The Vietnamese government and MOT have already issued notifications¹⁶ to this effect. Corresponding to the above proposal, JICA formulated the "Guidance on security control of ODA construction works," summarizing basic policies of safety management and concrete technical instructions related to safe construction works for the purpose of prevention of labor accidents and public damage in ODA construction works of public facilities.

¹⁵ <https://www.mofa.go.jp/mofaj/area/vietnam/canto.html>,
<https://www.mofa.go.jp/ICSFiles/afieldfile/2008/07/15/att2.pdf>

¹⁶ the Decree No. 46/2015 / ND-CP on 12/05/2015 on quality management and maintenance of construction works, (by central government) , Circular 26/2016 / TT-BXD. dated October 26, 2016 and Circular 04/2019 / TT-BXD dated August 16, 2019 (by MOT)

JICA is also expected to assist implementing such measures (monitoring the quality of both tentative and final structures) for similar ODA Loan projects to be conducted in Vietnam in future.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs		
Cuu Long (Can Tho) Bridge Construction Project	Hybrid (Steel and Prestressed Concrete) Cable bridge - Center span arrangement: 550 m - Length: 1,090 m - Foundation Type: Cast in place RC Pile of 100 m depth	Hybrid (Steel and Prestressed Concrete) Cable bridge - Center span arrangement: 550 m - Length: 1,010 m - Foundation Type: Cast in place RC Pile of depth of 92 m (north) and 94 m (south on water)
	Approach span Bridge Vinh Long side (Connected PC-I Girder, length: 480 m)	Approach span Bridge Vinh Long side (Connected PC-I Girder, length: 520 m)
	Approach span Bridge Can Tho side (Connected PC-I Girder, Connected PC Box-Girder, length: 1,180 m)	Approach span Bridge Can Tho side (Connected PC-I Girder, Connected PC Box-Girder, length: 1,220 m)
	Inspection and maintenance vehicle: 1	Inspection and maintenance vehicle: 1
		Countermeasure for settlement at Approach span Bridge, Vinh Long side, Structure Health Monitoring System, Additional countermeasure (piling) for settlement in north side Approach span Bridge, Vinh Long side
National Highway No. 1 Bypass Road Construction Project 1. Ving Long side	Length: 5,410 m	Length: 5,410 m
	Minor bridges: 3	Minor bridges: 4
	Interchange: -Semi-Y Type (NH.1) -Diamond Type (NH.54)	Interchange: -Semi-Y Type (NH.1) -Diamond Type (NH.54)
	Service area: 21,000 m ²	Service area: 21,000 m ²
2. Can Tho side	Length: 7,690 m	Length: 7,690 m
	Minor bridges: 7	Minor bridges: 9
	Interchange: -T-type Grade Intersection (NH.1), -Diamond Type (NH 91)	Interchange: -T-type Grade Intersection (NH.1), -Diamond Type (NH 91)
		Flyover at interchange
	Service area: 21,000 m ²	Service area: 21,000 m ²
	Toll gate: 1 (installed once but removed later because of suspension of toll collection)	
Consulting services	<ul style="list-style-type: none"> • Review of Detailed Design (D/D) • Support for bidding and making contract • Construction management • Technical guidance • Environmental countermeasures 	<ul style="list-style-type: none"> • Review of Detailed Design (D/D) • Support for bidding and making contract • Construction management • Technical guidance • Environmental countermeasures
2. Project Period	March 2001 – December 2006 (70 months)	March 2001 – March 2010 (109 months)
3. Project Cost	Amount Paid in Foreign Currency	27,912 million yen
	Amount Paid in Local Currency	11,194 million yen
		(1,461,358 million Vietnamese Dong)
	Total	39,106 million yen
	ODA Loan Portion	33,240 million yen
Exchange Rate	1 Vietnamese Dong = 0.00766 yen (As of October 2000)	21,978 million yen
		20,410 million yen
		(3,586,995 million Vietnamese Dong)
		42,388 million yen
		40,604 million yen
		1 Vietnamese Dong = 0.00569 yen (IFS average between 2003 and 2017)

4. Final Disbursement	National Highway No. 1 Bypass Road Construction Project: March 2012 National Highway No. 1 Bypass Road Construction Project (II): February 2018 Cuu Long (Can Tho) Bridge Construction Project: March 2012 Cuu Long (Can Tho) Bridge Construction Project (II): February 2018
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