

Vietnam

Ex-post Evaluation of Japanese ODA Loan Project  
**National Highway No. 10 Improvement Project (I) (II)**

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## 1 . Project Description



Project Site



National Highway No.10

### 1.1 Background

National Highway No.10 is an arterial road in Northern Vietnam, extending approximately 150 kilometers, with two-lane on each way. It links via National Highway No.18 in part Hai Phong Port, the international port in Northern Vietnam, and Hai Phong City, where the port is situated, with Ninh Binh City, the key city in the southern part of the Red River Delta, stretching across the delta.

Above all, it runs through Quang Ninh Province and Hai Phong City, which are located inside the economic triangle in the northern area, formed by Capital Hanoi, Hai Phong and Ha Long. This area is a logistics base with the international port serving as an entrance to the country. Furthermore, it is positioned as a second center for the development of the northern area following Hanoi, as its economic activities include active attraction of foreign investment needed for industrial development. On the other end of the highway, the areas around Ninh Binh are increasingly urbanized along National Highway No.1. Nevertheless, the coastal area sandwiched by the two areas remains as an agricultural belt relatively underdeveloped in terms of commercialization and industrialization, because the area is isolated by the Red River's tributaries and is not very accessible accordingly. That being the case, the improvement of National Highway No.10 was expected to lead to better accessibility

for the downstream area of the Red River Delta to the urban area and markets, thereby cultivating the agriculture, commerce and industry and raising the income levels in the region. It was also expected to significantly improve access for logistics from Nam Dinh and the areas south of Ninh Binh to Hai Phong Port, by providing a bypass instead of passing through Hanoi.

## 1.2 Project Outline

The objective of the project is to enhance road transportation and to facilitate smooth logistics by rehabilitating and/or replacing the existing road and bridges, and constructing bridges at ferry crossing points and bypasses in the urban areas on the National Highway No.10, thereby contributing to the promotion of industry and trade and the enhancement of the living standard in the northern part of Vietnam.

	Phase I	Phase II
Approved Amount / Disbursed Amount	17,742 million Yen / 16,083 million Yen	12,719 million Yen / 10,793 million Yen
Exchange of Notes Date / Loan Agreement Signing Date	March, 1998 / March, 1998	March, 2000 / March, 2000
Terms and Conditions	Interest Rate: 1.8% p.a. (Goods & Services) 0.75% p.a. (Consulting Services)  Repayment Period/Grace period: 30years/10years (Goods & Services) 40years/10years (Consulting Services)  Conditions for Procurement General Untied (Goods & Services) Partially Untied (Consulting Services)	Interest Rate: 1.8% p.a. (Goods & Services)  Repayment Period/Grace period : 30years/10years (Goods & Services)  Conditions for Procurement General Untied (Goods & Services)
Borrower / Executing Agency	The Government of Socialist Republic of Vietnam / Ministry of Transport (MOT), Project Management Unit 2 (PMU2) <sup>1</sup>	
Final Disbursement Date	January, 2008	

<sup>1</sup> The name at the time of the evaluation. The executing agency was called Project Management Unit 18 at the time of project implementation and was later renamed on July 15, 2008.

Main Contractor (Over 1 billion yen)	<p>【 B3 Package 】 Civil Engineering Construction Corporation No.5 (Vietnam) • Civil Engineering Construction Corporation No.1(Vietnam)• Keang Nam Enterprises Ltd.(Korea) (JV) / 【 B4 Package 】 Civil Engineering Construction Corporation No.6(Vietnam) • Civil Engineering Construction Corporation No.8(Vietnam) (JV) / 【 B5 Package 】 Sumitomo Construction Co., Ltd. (Japan) • Thang Long Construction Corporation(Vietnam) (JV) / 【 R3 Package 】 Civil Engineering Construction Corporation No.1(Vietnam) • Song Da Construction Corporation(Vietnam) • Vietnam Waterway Construction Corporation(Vietnam) (JV) / 【 R4 Package 】 Civil Engineering Construction Corporation No.8(Vietnam) • Vinaconex(Vietnam) (JV) / 【 R5 Package 】 Civil Engineering Construction Corporation No.5(Vietnam) • Civil Engineering Construction Corporation No.4(Vietnam) • Thang Long Construction Corporation(Vietnam) (JV) / 【 S1 Package 】 Civil Engineering Construction Corporation No.5(Vietnam) • Civil Engineering Construction Corporation No.1(Vietnam) (JV) / 【 S2 Package 】 Civil Engineering Construction Corporation No.4(Vietnam) / 【 S4 Package 】 Thang Long Construction Corporation(Vietnam) • Truong Son Construction Corporation(Vietnam) (JV)</p>
Main Consultant (Over 100 million yen)	Nippon Koei Co., Ltd. (Japan) • Transport Engineering Design Corporation(Vietnam) (JV)
Feasibility Study etc.	<p>1994 JICA Northern Vietnam Traffic Master Plan  1996 Government of Vietnam  1997 JICA SAPROF Team</p>

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

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

## **2.2 Duration of Evaluation Study**

Duration of the Study: September, 2009-June, 2010

Duration of the Field Study: 7-19, December, 2009, 22-27 March, 2010

## **2.3 Constraints during the Evaluation Study**

None.

## **3. Results of Evaluation (Overall Rating: B)**

### **3.1 Relevance (Rating: a)**

#### **3.1.1 Relevance with the Development Policies of Vietnam**

At the times of appraisal, the Government of Vietnam had set high priority to the transport sector, based on its Socio-Economic Development Plan 1996-2000 (so called the Sixth Five-year Plan), which aims at "attaining smooth traffic on trunk routes" as one of the primary development goals in its effort to create a setting effective for socio-economic development. At the sectoral level, the Government of Vietnam was committed to embark on the development of road networks to accommodate future traffic demand, while placing priority to the repair of existing roads.

At the time of the ex-post evaluation, the Government had attached utmost importance to "rapid and sustainable economic growth" in its Socio-Economic Development Plan 2006-2010, or the Eighth Five-year Plan. More specifically, it had identified as one of the key development goals in the transport sector the rehabilitation of arterial roads that link major cities and gave high priority to the development of arterial road networks. Meanwhile, the Government stated, "Economic growth provoked by economic growth stimulus initiatives, such as large-scale infrastructure development projects, will contribute to poverty reduction" in the Comprehensive Poverty Reduction and Growth Strategy (CPRGS), the Vietnamese version of Poverty Reduction Strategy Paper (PRSP) formulated in 2002 as an action plan for the Socio-Economic Development Plan 2001-2005 (Seventh Five-year Plan). The CPRGS was then integrated into the Eighth Five-year Plan; hence, the development of transport infrastructure, which contributes to poverty reduction through economic growth, has remained as a priority issue. At the sectoral level, the Government of Vietnam has prescribed the promotion of development and maintenance of traffic infrastructure in the northern economic areas by 2020, with a resolution adopted by the Politburo in 2003 and a cabinet resolution in 2004. Thus, the development of traffic infrastructure in Northern Vietnam is still positioned as a priority issue.

#### **3.1.2 Relevance with the Development Needs of Vietnam**

At the times of appraisal, the movement of freight and passengers in Vietnam depended heavily on the road sector—64.9% for freight on the weight basis and 78.6% for passengers in terms of the number of persons (actual records for 1997) (See Table 1.) The roads in the country, however, were not well maintained due to the past conflicts and budgetary constraints, and did not suffice the due role in mid- and long-distance transportation. As far as National Highway No.10 is concerned, the road condition was extremely poor, as seen in damaged road surface and decrepit bridges, and hence the highway was not favorable for vehicles. Besides, the width and hard shoulders were not sufficient for both vehicles and pedestrians in many sections. There were some sections where ferry boats were needed to cross the river or the port, which severely hinder smooth traffic.

At the time of the ex-post evaluation, likewise, the domestic transport of goods and people hinged heavily on the road infrastructure; the dependency was still on the rise. As for the shares of passenger and cargo transport volumes by transport mode in 2009, the road accounted for 73.2% of cargo (on the weight basis) and 90.4% of passengers (in terms of the number of persons). The total traffic volume on National Highway No.10 was also on the rise; thus, the need for improving the highway was as high at the time of the ex-post evaluation. The traffic volume measured at the three measuring points along the highway roughly doubled from 2003 to 2009<sup>2</sup>. Concretely, the actual average daily traffic volume by year for sections along the National Highway No.10 are: 4,107, 7,492, and 4,112 in 2009, which are more than double the traffic in the respective sections in 2003 (2,080, 3,301, and 2,057, respectively).

Table 1: Share of Volume of Passenger and Cargo Transport by Mode of Transport

Mode of Transport/ Share	1997		1999		2009	
	Volume Share (%)	Volume·km Share (%)	Volume Share (%)	Volume·km Share (%)	Volume Share (%)	Volume·km Share (%)
Passengers						
Rail	1.4	8.9	1.3	8.9	0.6	4.6
<b>Road</b>	<b>78.6</b>	<b>68.7</b>	<b>80.6</b>	<b>69.7</b>	<b>90.4</b>	<b>72.2</b>
Others	20.0	22.4	18.1	21.4	9.0	23.2
Cargo						
Rail	2.7	3.4	2.5	2.9	1.3	2.1
<b>Road</b>	<b>64.9</b>	<b>13.7</b>	<b>64.2</b>	<b>14.1</b>	<b>73.2</b>	<b>12.7</b>
Others	32.4	82.9	33.3	83.0	25.5	85.2

Source: General Statistics Office of Vietnam

\* “Others” include inland waterways, maritime transport and air

\* Data for 2009 cover up to November 2009

### 3.1.3 Relevance with Japan's ODA Policy

Japan's Country Assistance Program to Vietnam (2004) specified the area covered by the project under review as one of the priority areas and matters in the transport sector as it is a focal area for economic growth in Northern Vietnam. Japan International Cooperation

<sup>2</sup> See more detailed traffic volume data on National Highway No. 10 provided in 3.3.1.1 (Effectiveness).

Agency (JICA) (former Japan Bank of International Cooperation (JBIC)) has been providing assistance mainly in infrastructure development since the restart of ODA loan projects in fiscal year 1993. The road sector, among others, was positioned as one of the most important sectors for assistance along with the power sector. The Study on the National Transport Development Strategy in the Socialist Republic of Vietnam (VITRANSS), conducted by JICA between 1999 and 2001, built the foundation for "promoting the development and maintenance of traffic infrastructure in the northern economic areas by 2020" advocated by the Government. The project under review is aimed to contribute to the economic development in the said area through improvement of road transport and realization of smooth logistics in Northern Vietnam. Thus, it is highly consistent with Japan's assistance strategy.

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

### 3.2 Efficiency (Rating: b)

#### 3.2.1 Project Outputs

##### 3.2.1.1 Civil Works

Table 2 compares the planned and actual outputs on civil works. All the works were completed nearly as planned.

Table 2: Comparison of Planned and Actual Project Outputs (Original Packages)

(i) Improvement of Roads and Bridges from Bi Cho to Ninh Binh

Package	Section	Plan	Actual	Difference
R1	North Hai Phong	12.4 km	12.4 km	Same as planned
R2	South Hai Phong	20.8 km	18.0 km	Nearly same as planned
R3	Thai Binh	39.7 km	38.8 km	Nearly same as planned
R4 <sup>3</sup>	Nam Dinh	32.6 km	32.4 km	Nearly same as planned

(ii) Construction of Bypass in Hai Phong Urban Areas

Package	Section	Plan	Actual	Difference
R5	Hai Phong Bypass	19.3 km	20.5 km	Nearly same as planned
R6	Hai Phong Urban	21.6 km	20.7 km	Widening of the road width in a section <sup>4</sup>

(iii) Construction of Bridges and Bypass at Ferry Crossing Points

Package	Section	Plan	Actual	Difference
B1	Da Bac Bridge	505 m	505 m	Same as planned
B2	Quy Cao Bridge	504 m	504 m	Same as planned
B3	Tan De Bridge	1,065 m	1,065 m	Same as planned
B5	Kien Bridge	1,136 m	1,186 m	Nearly same as planned

<sup>3</sup> The construction of a flyover, which was deemed appropriate from the technical perspective as well as from the standpoints of traffic congestion, safety and so forth at the time of the second phase appraisal was added to the R4 package and is completed nearly as planned.

<sup>4</sup> Based on the geographical features, the scope of the package was expanded from an 8-meter embankment and a 7-meter paved road to a 12-meter embankment and an 11-meter road.

## (iv) Construction of Bridges and Bypass at the Bridge Utilized for both Road and Rail Road

Package	Section	Plan	Actual	Difference
B4 <sup>5</sup>	Non Nuoc Bridge Bypass	app. 7 km	7.1 km	Same as planned

Source: JICA's internal documents and results from questionnaire surveys and interviews during the on-site surveys.

In addition to the above, the project included the planning and completion of additional outputs using the residual project fund. Based on the experience in implementing additional works using the residual project fund in "National Highway No.5 Improvement Project", another yen loan project, the provincial and municipal governments along the roads covered by the project had requested the Ministry of Transport (MOT) for additional outputs. All the additional works requested were consistent with the Vietnam Transport Development Strategy 2020 and positioned as priority road development projects by the provincial and municipal governments. The completed outputs have expanded road networks and hence realized smooth logistics. Thus, the addition of these outputs is deemed as relevant.

Table 3 outlines the additional outputs implemented in the project.

Table 3: Additional Outputs on Civil Works

## (i) Supplementary Works for Phase I Packages

Additional Packages	Section	Description	Distance/Length (Actual)
P1	Bo Bridge	Replacing the poorly-conditioned bridge connecting National Highway No.10 to the Thai Binh and city center and improving its approach roads.	1.6km
P2	Nui Deo - Pha Rung Section + Provincial Road 355	Connecting newly-constructed National Highway No.10 (Hai Phong Bypass) and old National Highway No.10 that runs through the Hai Phong city center and developing a provincial road leading to the Pha Rung ferry terminal.	8.6km + 9.5km
P3	Provincial Roads 351 and 357	Developing two provincial roads that connect to new National Highway No.10 (Hai Phong Bypass)	10.8km + 5.0km
P4	National Highway No.1 - National Highway No.10 Connection Road	Developing a road connecting National Highway No.10 and National Highway No.1 in Ninh Binh Province.	6.4km

## (ii) Supplementary Works for Phase II Packages

Additional Packages	Section	Description	Distance/Length (Actual)
S1	Construction of Thai Binh Bypass	Constructing a bypass which links two points in Thai Binh Province on National Highway No.10.	11.5km
S2	Construction of section from Loc An to National Highway No. 21	Constructing a road section that detours the Thai Binh city center and connects National Highway No.10 and National Highway No. 21.	6.9km
S3	Upgrading of sections from Goi to Binh Luc	Upgrading a road section with bridges that links Goi (in Nam Dinh Province) on National Highway No.10 with National Highway No. 21.	A 14-km-long road and three small bridges
S4	Construction of Provincial Road 191	Constructing a provincial road section with bridges that extends from neighboring Hai Duong Province to National Highway No.10 in Hai Phong City.	A 25.7-km-long road section and two bridges

<sup>5</sup> The construction of a flyover, which was deemed appropriate from the technical perspective as well as from the standpoints of traffic congestion, safety and so forth at the time of the second phase appraisal was added to the B4 package and is completed nearly as planned.

S5	Construction of Quan Toan Interchange	Constructing an interchange (flyover) that connects National Highway No.10 and National Highway No. 5 in Hai Phong City.	210-m-long flyover
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Source: JICA's internal documents and results from questionnaire surveys and interviews during the on-site surveys.

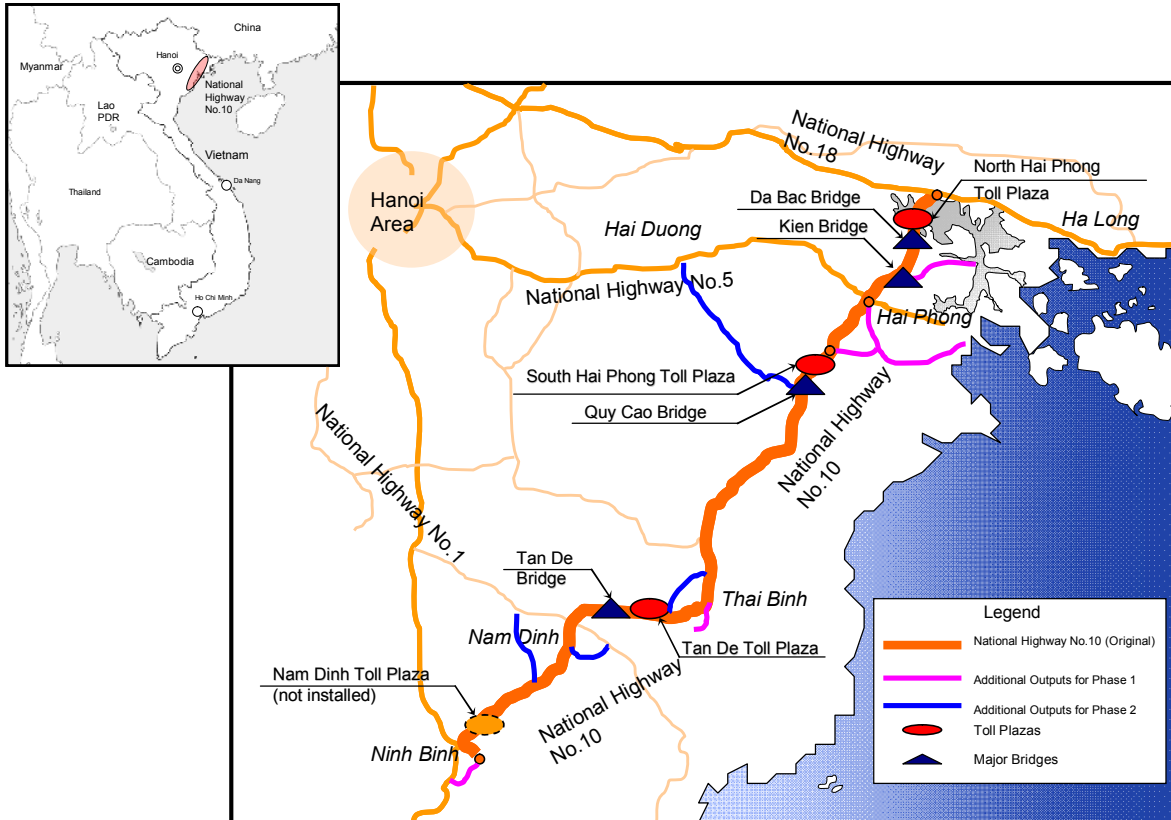


Figure 1: Location of the Project Site

### 3.2.1.2 Operation and Maintenance Equipments

As for the procurement of operation and maintenance equipment, namely maintenance equipment, transporters and inspection and monitoring apparatus, there was no significant change to the plan, in principle, but minor changes were made in part to reflect the executing agency's technical level improved and the change in demand for equipment during the period between the planning and the actual procurement.

### 3.2.1.3 Toll Plaza

Initially, four toll plazas were planned to be provided in the project, but only three were installed in the end. Of these, one location (North Hai Phong Toll Plaza) has not been used since its completion (see Table 4.)



Table 4: Installation and Utilization of Toll Plazas

Name of toll plaza (from north to south)	Plan	Actual	Utilization	Distance
1. North Hai Phong Toll Plaza	○	○	×	Approx. 33km
2. South Hai Phong Toll Plaza (so-called Tien Cuu Toll Plaza)	○	○	○	
3. Tan De Toll Plaza	○	○	○	Approx. 55km
4. Nam Dinh Toll Plaza	○	×	—	Approx. 30km

Source: Results from site visits and interviews during the on-site surveys.

This is because the Ministry of Finance (MOF) ordained Circular 90, which requires any two toll plazas to be 70 kilometers apart at the minimum, in 2004 immediately after North Hai Phong Toll Plaza was put in place. The plaza in question happens to be too close to South Hai Phong Toll Plaza on National Highway No.10, which was provided by an ODA loan project, to secure this distance. Thus, it has been put into disuse. Considering that the loan contract of this project was signed in 1998 whereas the MOF enacted Circular 90 in 2004, it was inevitably impossible to know or predict the situation at the times of appraisal. (Distance between South Hai Phong and Tan De Toll Plazas is less than 70km, however, MOT has decided to install and operate them.) As for Nam Dinh Toll Plaza, the MOT had decided to withdraw the construction prior to the start of the tender process, due to several factors including its location that is too close to a toll plaza on adjacent National Highway No.1.



Tan De Toll Plaza

#### 3.2.1.4 Consulting Services

With respect to consulting services, there were more inputs, both foreign and Vietnamese (local) consultants, than originally planned (see Table 5.) This primarily results from (i) the additional works (construction of flyovers) in the R4 and B4 packages, (ii) the widening of the road width in the R6 package and (iii) the extended construction period needed for implementing additional inputs using the residual project fund.

Table 5: Comparison Between the Planned and Actual Consulting Service Inputs (M/M)

	Contents of Work	Plan	Actual
Foreign	Engineering Services	262	287
	Supervision	335	399
	Total	597	686
Local	Engineering Services	285	554
	Supervision	926	1,843
	Total	1,211	2,397

Source: JICA's internal documents and results from questionnaire surveys and interviews during the on-site surveys.

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Period

The project period was longer than planned.

The project under review was scheduled for 54 months from March 1998 to August 2002 at the times of appraisal. In actuality, it took 79 months, 146% of the planned period, from March 1998 to September 2004, just to complete the originally-planned outputs. Furthermore, the additional outputs were finally completed in September 2007 (see Tables 6 and 7.)

The main reason for the delay in schedule was the extra time needed for local contractors to deal with environmental considerations and safety measures, particularly in the packages to construct road running through urban areas. As is explained later, the amounts of construction costs, lowered as a result of competitive biddings, were not sufficient for implementing measures necessary during construction: adequate management of surplus soil, air and water pollution control, and noise and vibration control for environmental considerations as well as observance with the truck loadage, speed and time restrictions, training and supervision of truck drivers and installation of traffic signs for safety concerns. Consequently, a longer time was needed for coordination and arrangements necessary for securing the fund for these measures.<sup>6</sup> The lack of fund was complemented at the expense of local (provincial and municipal) governments. (Source: Results from interviews with PMU2.)

Other causes of delay include (i) additional work was necessary for soft soil treatment in some sections because the project site was near the sea and (ii) approval process by the Government of Vietnam as to the implementation of the project. (Source: Same as above.)

Table 6: Comparison of Planned and Actual Project Period

	Phase I (Plan)	Phase II (Plan)	Phase I and II (Actual)
Detailed Design	February 1998 – December 2000	November 1998 – December 1999	November 1998 – December 1999
P/Q · Bidding · Contract	February 1998 – December 2000	February 1999 – September 2000	January 1999 – September 2000
Land Acquisition · resettlement	January 1998 – December 2000	May 1999 – July 2001	N.A.
Civil Works	January 1999 – February 2002	November 1999 – August 2002	November 1999 – September 2004
Procurement of O&M Equipments	January 2000 – December 2000, May 2001 – March 2002	December 1999 – December 2001	December 2001 – December 2002, June 2002 – June 2003
Consulting Services	February 1998 – February 2002	November 1998 – August 2002	November 1998 – August 2002

<sup>6</sup> According to PMU2, sufficient environmental and safety measures have taken place despite longer time was necessary.

Source: JICA's internal documents and results from questionnaire surveys to PMU2 and interviews during the on-site surveys.

Note 1) The project consists of the first and second phases, but the scope of project is considered as one. Thus, the overall implementation schedule, which was drawn up at the time of the appraisal for Phase I, was reexamined at the time of the appraisal for Phase II.

Note 2) The bidding and contracting periods and the civil works periods appear to overlap in the above table because the project includes multiple procurement packages. These periods do not overlap on a single package basis.

Table 7: Project Period for Additional Outputs

	Additional Outputs for Phases I and II (Actual)
Detailed Design	September 2002 – October 2006
P/Q, Bidding, Contract	May 2003 – March 2005
Land Acquisition, Resettlement	N.A.
Civil Works	December 2003 – September 2007
Consulting Services	September 2002 – February 2005

Source: Results from questionnaire surveys to PMU2 and interviews during the on-site surveys.

### 3.2.2.2 Project Cost

Total project cost was lower than planned.

The total cost of the project was originally 36,523 million yen (the Japanese ODA loan share was 30,461 million yen, including 17,742 million yen for Phase I and 12,719 million yen for Phase II.) The actual project cost, including that for additional works<sup>7</sup>, was 27,759 million yen (the Japanese ODA loan share was 26,876 million yen). Thus, the project cost was kept lower than planned (76% of the planned amount.)

The main reasons for cost-under run were as follows: (i) the severe competition at the times of biddings reduced the bid prices to below the estimated prices and eventually saved the costs incurred in the project significantly (the successful bid price for each package is around 50-60% of the estimated price), and (ii) the local currency, Vietnam dong (VND) depreciated against JPY.

Although the project period was longer than planned (146% of the original plan), the project cost was lower than planned (76% of the original plan), therefore efficiency of the project is fair.

## 3.3 Effectiveness (Rating: a)

### 3.3.1 Quantitative Effects

#### 3.3.1.1 Results from Operation and Effect Indicators

Table 8 shows actual and projected traffic volumes on National Highway No.10 at the time

<sup>7</sup> The total project cost for additional works was approximately 10,724 million yen (excluding interest during construction).

of the evaluation.<sup>8</sup> Because the traffic projection data for these sections at the times of appraisal are not available, it is hard to compare the actual data with traffic projection at the times of appraisal. Nevertheless, a comparison of the traffic volume between 2003, before the project, and 2009, after the project outputs were put in service, has revealed that it increased more than two-fold on all three sections. In addition, it is forecast to further double from 2009 to 2020 and traffic demand is projected to continue to grow at high levels.

Table 8: Annual Average Daily Traffic

Location	Actual							Projection		
	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020
Km19+780 (in service from 2003) Near Da Bac Bridge	2,080	2,622	2,678	2,873	3,101	3,404	4,107	4,353	5,832	7,803
Km74+800 (in service from 2003) South of Quy Cao Bridge	3,301	3,367	2,451	3,147	3,760	6,273	7,492	7,941	10,638	14,234
Km114+800 (in service from 2002) Near Tan De Bridge	2,057	2,033	2,336	2,783	2,904	3,163	4,112	4,358	5,839	7,812

Source: Regional Road Maintenance Units 2 (RRMU2) under Vietnam Road Administration (VRA)

Note): The above figures are averages of traffic volumes measured for three days on the 5th, 6th and 7th day of each month.

In terms of cost-saving for ferry operation, Table 9 presents the expenses spent for Tan De Ferry.<sup>9</sup> The ferry has no longer been operated since the project provided the bridge. Thus, all the operating costs in the table have been saved as a result of the implementation of the project.

Table 9: Expenses for Tan De Ferry (Unit: million VND)

Expenses for operating Tan De Ferry (2000)	3,755.2
Expenses for operating Tan De Ferry (2001)	4,700.0

Source: Results from questionnaire surveys to VRA

### 3.3.1.2 Results of Calculations of Internal Rates of Return (IRR)

Due to the fact that data needed for quantitative analysis was not available, analysis for the internal rate of return was not possible<sup>10</sup>.

<sup>8</sup> Due to the fact that the actual and projected traffic data for the same sections and the same measuring method at the times of appraisal was not available, traffic data obtained at the time of evaluation is presented.

<sup>9</sup> The main users of the ferry were pedestrians, motorbike and bicycle passengers.

<sup>10</sup> VRA does not have data on the travel time in the project site at the time of project planning; thus there is no data available on time saving before and after the project (no OD survey has been conducted.) Likewise, VRA does not have data on increases of travel speeds (no OD survey has been conducted.) For cost saving on ferry operating expenses, data other than those for Tan De Ferry was not available.

### 3.3.2 Qualitative Effects

#### Realizing smooth logistics in Northern Vietnam

A beneficiary survey<sup>11</sup> was conducted targeting on residents, farmers and companies situated along National Highway No. 10, with respect to the travel time and cost after the completion of the project. The survey results are summarized in Table 10. More than 90% of the respondents expressed that their travel time and cost had reduced. This implies that the implementation of the project has brought about time efficiency and cost reduction effects.

Table 10: Comparison of Travel Time and Cost Before and After the Project (N=365)

Question	Decreased		Did Not Decrease		No Idea	
	Count	%	Count	%	Count	%
Current situation of Travel Time	339	92.9	13	3.6	13	3.6
Current situation of Travel Cost	341	93.4	6	1.6	18	4.9

Source: Results from the beneficiary survey

Note): The above figures are half-adjusted (rounded) numbers; the sum may not necessarily become 100.

Concerning the logistics on National Highway No.10 after the project, the beneficiary survey (of companies) found the following results in Table 11. According to the survey, more than 90% of the corporate respondents expressed that it became easier to purchase and transport raw materials and ship and deliver their products and services after the completion of the project. It is deemed that the implementation of the project has contributed to facilitate smooth logistics in this area.

Table 11: Logistics on National Highway No.10 After the Project Completion (N=52)

Question	Easier		No change		Unclear/unknown	
	No. of respondents	%	No. of respondents	%	No. of respondents	%
Purchasing and transporting raw materials	50	96.2	-	-	2	3.8
Transporting and delivering products and services	48	92.3	1	1.9	3	5.8

Source: Results from the beneficiary survey

Moreover, interview surveys were conducted targeting on parties concerned, as part of the on-site survey to learn changes in the travel time on National Highway No.10 before and after the completion of the project. All the respondents acknowledged shortened travel times and improved logistics between provinces and regions. In particular, the development of river-crossing bridges significantly reduced time for crossing the rivers, which had been possible only by using ferries. Table 12 exhibits the results of the survey.

<sup>11</sup> A beneficiary survey was conducted in the form of face-to-face hearing surveys with 365 interviewees including 313 local inhabitants and farmers and personnel from 52 companies in the neighborhood of National Highway No. 10 (Thai Binh Province, Nam Dinh Province, Ninh Binh Province, Hai Phong City.)

In addition, PMU2 pointed out the following qualitative effects.

- Thai Binh Province benefited most from the project, in terms of smooth logistics. (Before the project, one had to cross both Hong River and Van Phuc River with the ferry in order to travel from the province to another.)
- The second largest beneficiary is Quang Ning Province. (One had to use the ferry to travel from the province to Hai Phong. Da Bac Bridge provided in the project made it smoother and facilitated logistics.)

Table 12: Reduction in Travel Time Before and After the Project

Before	After	Source
Quang Ninh to Ninh Binh: 10 hours	3 hours	PMU2
Hai Phong Central Area to Bin Bao (45km): 3 hours(Using two Ferries)	50-60 minutes	Hai Phong Department of Transport
Thai Binh Province to Ha Noi: 4 hours (Via NH1)	2 hours	Thai Binh Department of Transport
Thai Binh Province to Hai Phong (70km): 3-4 hours	1.5 hours	
Thai Binh Province to Quang Ninh Province (40km): 6-7 hours (Via NH18)	2.5hours	
River crossing by Tan De ferry: 30 minutes one way (half-day at maximum during rush hours, no operation during night time)	Utilization of bridge (1minute by car and motorbike)	
Kien Bridge to Hai Phong City: 3 hours (by using bicycle and a ferry)	1 hour by bicycle, 30 minutes by motor bike (Via Kien Bridge and Binh Bridge)	Resident near Kien Bridge

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

### 3.4 Impact

#### 3.4.1 Intended Impact

##### 3.4.1.1 Promotion of Industry and Trade in Northern Vietnam

##### Trend of GRDP in target region

Table 13 summarizes the trend of gross regional domestic product (GRDP) of each province or city along National Highway No.10. Of the districts, Quang Ning Province is most developed with an average GRDP growth per annum being 12.2 to 16.4%. The other provinces and Hai Phong City as well have achieved high growth since around 2005. The growth rates in Ninh Binh Province are most outstanding, as it was least developed among the provinces and the city.

Table 13: GRDP Data for Provinces/City Along National Highway No. 10

Province City	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Quang Ninh			3433.0	3996.1	4506.2	5092.5	5715.5	6451.3	7336.0	8347.0	9488.0	10723.0
				16.4	12.8	13.0	12.2	12.9	13.7	13.8	13.7	13.0
Thai Binh	4031.0	4187.0	4420.1	4557.9	4778.5	5137.1	5431.0	5988.0	6464.0	7136.0	7966.0	8919.0
	4.1	3.9	5.5	3.1	4.8	7.5	5.7	10.3	7.9	10.4	11.6	12.0
Nam Dinh	3739.1	4012.2	4235.0	4500.4	4688.0	5125.6	5521.3	5976.9	6396.6	7133.4	7954.3	8831.6
	11.8	7.3	5.6	6.3	6.4	7.1	7.7	8.2	7.0	11.5	11.5	11.0
Ninh Binh	1417.3	1523.6	1616.6	1736.7	1968.9	2135.8	2387.0	2820.1	3397.3	3825.4	4395.5	5224.3
	13.1	7.5	6.1	7.4	13.4	8.5	11.8	12.0	20.5	12.6	14.9	18.9
Hai Phong			7339.5	8313.7	9176.5	10153.8	11241.6	12536.0	14043.1	15801.4	17814.6	20133.2
				13.3	10.4	10.7	10.7	11.5	12.0	12.5	12.7	13.0

Source: General Statistics Office of Vietnam

Note 1): The upper rows indicate the respective GRDPs (Unit: billion US dollars (USD)), whereas the lower rows show the year-on-year growth rates (Unit: %).

Note 2): GRDP is calculated based on the prices in 1994.

The above growth records largely outnumber the GDP growth rate nationwide during the same period (6.8-8.5%, based on the prices in 1994, according to the General Statistics Office of Vietnam). Although direct causality between the project and the GRDP growth should not be very strong, the project seems to have indirectly contributed to the growth and expansion of the local economies by increasing the industrial produce and enhancing foreign direct investment (FDI) through improvement in the logistics (to be discussed in more detail later.)

#### Trend of industrial production volume and FDI in target region

Table 14 suggests that the amounts of industrial production in the provinces and the city along National Highway No.10 are conspicuously on the rise. Thai Binh Province and Nam Dinh Province, in particular, have recorded growth rates exceeding 20% since 2005. Moreover, new FDI projects and registered capital in the northern region started to swell in 2005, in terms of the number of projects and the amount of capital, in Hai Phong City. New investments have constantly been made also in Quang Ning Province and other provinces (Table 15).

Similarly to the GRDP, growths in industrial outputs and FDI are linked with not only traffic networks but various other factors, thus the growths do not exclusively denote impacts brought about by the project. Still, the project seems to have contributed partially to creating an investment climate through road development, which upgraded accessibility from the region along National Highway No.10 to other areas.

Also, industrial parks were built in Thai Binh Province concurrently with the development of National Highway No.10<sup>12</sup>. The project also appears to have contributed to the progress

<sup>12</sup> According to the Department of Transport of Thai Binh Province, two industrial parks were developed in

in industrial development in the province.

Table 14: Industrial Production Data for Provinces/City Along National Highway No. 10

Province City	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Quang Ninh	2666.2	2910.0	3139.5	3788.8	4358.9	5038.1	5982.5	6421.2	8066.9	9307.9	10859.5	11986.9
	16.1	9.1	7.9	20.7	15.0	15.6	18.7	7.3	25.6	15.4	16.7	10.4
Thai Binh	1160.8	1238.3	1307.2	1397.0	1588.8	1796.7	2026.1	2424.1	2917.5	3596.2	4476.4	5479.1
	9.3	6.7	5.6	6.9	13.7	13.1	12.8	19.6	20.4	23.3	24.5	22.4
Nam Dinh	1079.7	1228.0	1327.4	1462.7	1673.0	1951.7	2301.0	2790.0	3424.1	4254.6	5249.5	6304.5
	9.0	13.7	8.1	10.2	14.4	16.7	17.9	21.3	22.7	24.3	23.4	20.1
Ninh Binh	357.5	425.9	440.3	513.4	563.9	631.8	1003.7	1244.0	1971.6	2456.9	2856.1	3744.2
	14.3	19.1	3.4	16.6	9.8	12.0	58.9	23.9	58.5	24.6	16.2	31.1
Hai Phong	4945.3	5681.5	6685.1	7995.2	9526	11172.4	12927	14920.1	17625.3	20776.4	24323.1	28336.4
	30.1	14.9	17.7	19.6	19.1	17.3	15.7	15.4	18.1	17.9	17.1	16.5

Source: General Statistics Office of Vietnam

\* The upper rows indicate the industrial production (Unit: billion VND), whereas the lower rows show the growth rates (Unit: %)

\* Industrial production based on the prices in 1994.

Table 15: Trend of FDI Projects in Northern Vietnam

Province City	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Quang Ninh	6	6	8	5	7	12	18	13	13	10	12	11
	290.8	61.7	16.2	5.5	7.6	39.3	71.0	97.3	98.5	40.2	200.6	180.6
Thai Binh				2		1		4		4	2	
				2.4		13.6		5.7		9.4	45.9	
Nam Dinh	2					5	3				4	3
	5.9					4.7	53.3				5.6	22.2
Ninh Binh	3		1					3			6	4
	15.8		1.3					2.5			404.3	39.3
Hai Phong	20	7	13	2	10	22	32	19	25	34	55	31
	330.4	11.0	40.3	2.5	13.1	36.7	130.3	277.9	289.8	168.9	540.0	310.9

Source: General Statistics Office of Vietnam (different from the data compiled by the Department of Planning and Investment, People's Committee of Hai Phong City)

\* The upper rows indicate the number of investment projects and the lower rows show the amounts of registered capital (Unit: million USD)

### Trend of the volume of cargo handled at Hai Phong Port

The annual volume of cargo handled at Hai Phong Port jumped three-fold from 4.6 million tons in 1997 to 13.9 million tons in 2008. The volume of exports has been increasing notably rapidly since 2005 (Table 16).

Although direct causality between the project and the increase in the volume of cargo handled at Hai Phong Port could not be identified as it involves various other factors, the project seems to have contributed to the facilitation of logistics through improvement in road transport.



Container yard at Hai Phong Port

the province after the completion of the project (original outputs), and another park and a university were constructed after the completion of the additional works. (Currently, there are eight industrial parks altogether in the province.)



Table 16: Volume of Cargo Handled at Hai Phong Port

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total	4,600	5,460	6,500	7,645	8,575	10,350	10,518	10,500	10,511	11,151	12,301	13,900
Export	1,702	3,813	945	1,234	1,336	1,400	1,758	1,800	1,911	2,825	2,684	3,231
Import	2,898	1,647	3,155	3,586	4,358	5,370	5,401	5,370	5,370	5,199	6,218	7,635
Domestic			2,400	2,825	2,881	3,580	3,359	3,330	3,230	3,127	3,399	3,034

Source: General Statistics Office of Vietnam (Unit: 1,000 ton)

Others (Beneficiary survey results)

A beneficiary survey was conducted on the status of industrial development along National Highway No.10 after the completion of the project. Table 17 provides the results of the survey.

Table 17: Industrial Development along National Highway No.10 after the Completion of the Project (N=365)

Question	Yes		No		Unclear/unknown	
	No. of respondents	%	No. of respondents	%	No. of respondents	%
Industrial development has been facilitated as a result of implementing the project.	332	91.0	6	1.6	27	7.4

Source: Results from the beneficiary survey

More than 90% of the respondents expressed that the industrial development in the areas along National Highway No.10 was facilitated as a result of implementing the project. Although direct causality between the project and the industrial development in the areas could not be identified as it involves various other factors than the expansion of the traffic network, it is deemed that the project has contributed to the enhancement of industrial development through improvement in the logistics across the area.

In the beneficiary survey, private companies that opened offices in the area or moved from other areas quoted the following as a reason for their entry: "The development of National Highway No.10 was one of the essential factors for our business expansion. Without the improvement of the highway, our business would not have expanded as it has today." This statement proves that the development of the traffic network has contributed to the improvement in the business environment and thus the business expansion of these companies.

### 3.4.1.2 Improvement in the Standard of Living in Northern Vietnam

As shown in Table 18, the GRDP per capita in the provinces and the city along National Highway No.10 has been rising sharply. It started to upsurge around 2005 when the original outputs were completed. This trend is particularly notable in Ninh Binh Province, which had been less developed than the other provinces.

Based on the GRDP figures, it is deemed that the project has indirectly contributed to the enhanced standards of living in Northern Vietnam, through capital inflow and expanded industrial production.

Table 18: Trend of GRDP Per Capita

Province City	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Quang Ninh	3842.6	4213.9	4625.9	5338.3	6179.2	7189.8	8441.6	9763.0	11705.9	14542.5	17218.4	20188.4
		9.7	9.8	15.4	15.8	16.4	17.4	15.7	19.9	24.2	18.4	17.2
Thai Binh	2601.3	3053.1	3083.6	3243.3	3448.6	3765.7	4054.6	4871.7	5857.0	6754.3	7988.1	10301.7
		17.4	1.0	5.2	6.3	9.2	7.7	20.2	20.2	15.3	18.3	29.0
Nam Dinh	2286.9	2594.6	2734.1	2855.6	3116.8	3450.5	3899.0	4499.7	5213.9	6207.8	7450.0	9751.7
		13.5	5.4	4.4	9.1	10.7	13.0	15.4	15.9	19.1	20.0	30.9
Ninh Binh	1828.8	2139.6	2137.5	2695.7	2974.3	3335.0	3679.1	4443.3	5437.3	6347.6	7870.7	11349.6
		17.0	-0.1	26.1	10.3	12.1	10.3	20.8	22.4	16.7	24.0	44.2
Hai Phong			5468.6	6189.3	6967.7	7914.1	8889.7	10403.8	11973.4	14134.9	17599.9	23346.9
			13.2	12.6	13.6	12.3	17.0	14.7	18.4	24.5	32.7	

Source: General Statistics Office of Vietnam

Note 1): The upper rows indicate the GRDP per capita (Unit: 1,000 VDN), whereas the lower rows show the year-on-year growth rates (Unit: %)

Note 2): The GRDP per capita is based on current prices in respective year.

A beneficiary survey was conducted on economic activities of farmers residing along National Highway No.10 after the completion of the project. The results from the survey are provided in Table 19. Around 90% of the respondents acknowledged that their economic activities were encouraged as a result of implementing the project. Also, it has become easier for farmers to change the job to industrial fields, which means more work options apart from agriculture. Thus, it is deemed that the project has brought about positive effects on farmers' livelihood.



Interview with residents along National Highway No.10

Table 19: Economic Activities of Farmers along National Highway No.10 after the Completion of the Project (N=313)

Question	Yes		No		Unclear/unknown	
	No. of respondents	%	No. of respondents	%	No. of respondents	%
It became easier to procure fertilizers and other supplies necessary for agricultural activities after the completion of the project.	291	93.0	5	1.6	17	5.4
It became easier to sell agricultural products after the completion of the project.	279	89.1	15	4.8	19	6.1
It became easier for the family to change the job from agriculture to industry after the completion of the project.	270	86.3	20	6.4	23	7.3

Source: Results from the beneficiary survey

### 3.4.2 Other Impacts

#### 3.4.2.1 Impact on Traffic Accidents

As shown in Table 20, the number of traffic accidents on National Highway No.10 has been at about the same level before and after the completion of the project. There is no statistically significant change seen after 2005<sup>13</sup>. However, the beneficiary survey focused on the traffic accident status on National Highway No.10 after the completion of the project found, as shown in Table 21, that 60% of the respondents feel that the number of accidents increased after the completion of the project.

Table 20: Number of Traffic Accidents along National Highway No.10

Year	No. of accidents (growth %)	No. of accidents involving deaths (growth %)	No. of accidents involving injury (growth %)
2003	126	45	90
2004	215 (70.6)	75 (66.7)	199 (121.1)
2005	91 (-57.7)	22 (-70.7)	125 (-37.2)
2006	212 (133.0)	57 (159.1)	222 (77.6)
2007	203 (-4.2)	72 (26.3)	210 (-5.4)
2008	215 (5.9)	54 (-25.0)	239 (13.8)

Source: Results from the questionnaire survey of RRMU2

<sup>13</sup> According to RRMU2, there was no specific reason for the drop in 2005.

Table 21: People's Perception on Traffic Accidents along National Highway No.10(N=365)

Question	Yes		No		Unclear/unknown	
	No. of respondents	%	No. of respondents	%	No. of respondents	%
There are more accidents after the completion of the project than before.	219	60.0	81	22.2	65	17.8

Source: Results from the beneficiary survey

The respondents raised the following factors as major causes of accidents: (i) the volume of traffic and driving speeds have increased, (ii) both automobiles and motorbikes use the same lanes, (iii) the development of infrastructure for traffic safety, such as installation of the center divider, is not sufficient, and (iv) the awareness of traffic safety is lacking.

Traffic accident continues to be a serious problem in Vietnam. In 1997, the Government established a National Traffic Safety Committee (NTSC), which formulates and implements traffic safety programs at the national level<sup>14</sup>. For example, the Road Traffic Law was revised in February 2009 to make the use of helmets compulsory, prohibit drink-driving, and so forth. The measures have been so effective that the degree of damage in traffic accidents has been alleviated on National Highway No.10, according to an interview survey of RRMU2. In the meantime, JICA has been assisting in preparing Vietnam's traffic safety measures through yen loan project: "Northern Vietnam National Roads Traffic Safety Improvement Project", which also covers National Highway No.10 in its scope.

The following measures are still needed for ensuring traffic safety.

- Put in place the central divider between the opposite bound lanes and other physical measures necessary for upgrading the infrastructure for traffic safety.
- Push forward more activities to raise drivers' and residents' awareness of traffic safety.
- Secure a budget necessary for establishing the traffic safety corridor<sup>15</sup>, including costs for removing illegal structures.

#### 3.4.2.2 Impacts on the natural environment

No significant negative impact on the natural environment has been observed during or after the implementation of the project.

<sup>14</sup> For instance, the NTSC carries out activities for raising awareness of drivers and local residents on traffic safety in collaboration with the Traffic Safety Committee of each provincial government, General Police Office, and the Ministry of Education and Training.

<sup>15</sup> Decision 1856 (2007), an administrative instruction of Decree 186, prohibits the placement of any structure within the 15-m distance from the edge of national highways. In urban areas, however, a significant number of illegal structures and private houses exist, which poses a concern over safety, environment and sanitation. In order to realize a traffic safety corridor, it is imperative to secure a budget for removing and relocating these structures.

The environmental impact assessment (EIA) for this project was completed in March 1999. As for environmental considerations to be given during the construction works, the contractors have submitted to PMU2 monthly reports on the status of implementing and monitoring environmental practices in line with the EIA, such as adequate management of surplus soil, air and water pollution control, and noise and vibration reduction measures. More specifically, (i) air pollution was evaluated by measuring the TSP concentration on a monthly basis; and (ii) water pollution was evaluated by measuring the suspended substance (SS), bio-chemical oxygen demand (BOD), dissolved oxygen (DO) and other parameters. All measurements have proved to be below the required levels, according to the hearing survey of PMU2. The environmental monitoring performed during the construction works is deemed as adequate in terms of frequency and contents. No particular environmental measures have been put in place after the completion of the project.

A beneficiary survey was conducted on the status of air and water pollution, and noise levels in relation to the increased volume of traffic after the completion of the project. Table 22 provides the results of the survey.

Table 22: Impacts on the Environment around National Highway No.10 after the Completion of the Project (N=365)

Question	Yes		No		Unclear/unknown	
	No. of respondents	%	No. of respondents	%	No. of respondents	%
Air pollution increased after the completion of the project.	193	52.9	121	33.2	51	14.0
Water pollution increased after the completion of the project.	108	29.6	169	46.3	88	24.1
Noise level increased after the completion of the project.	198	54.2	112	30.7	55	15.1

Source: Results from the beneficiary survey

Note): The above figures are half-adjusted (rounded). The sum may not necessarily become 100.

According to the above results, more than 50% of the residents in the vicinity think "air pollution increased" and "the noise level increased" after the completion of the project, while those replying "water pollution increased" accounted for less than 30% of the respondents. Although the possibility of the presence of other external factors cannot be eliminated, there is a certain level of causality between the project and the increases in air pollution and noise level. Therefore, monitoring after the project completion and implementation of alleviation measures are necessary in accordance with the results of monitoring. On the contrary, causality between the project and water pollution is deemed as minimal. Significant impact on safe water access and drainage for residents along the project sites has not been found. Incidentally, the beneficiary survey did not include questions focusing solely on the

environmental impacts during the implementation of the project.

An interview survey<sup>16</sup> targeted at residents in the vicinity of Kien Bridge has identified that some feel that there is more dust than before in accordance with the increase in the traffic volume as a result of implementing the project. In addition, they mentioned that the level of noise caused by container trucks passing during the nighttime between 20 o'clock and 3 o'clock was acceptable.

### 3.4.2.3 Land Acquisition and Resettlement

The project involved the resettlement of residents and acquisition of land in preparation for carrying out the construction works. JICA's preliminary study (SAPROF) estimated that around 360 households would be subject to resettlement. The actual numbers of households involved is given in Table 23. The central part of the action was to compensate land owners for their land, because the project basically focused on improving the existing road. (The right columns of Table 23 describe the processes of land acquisition and resettlement and the roles of parties concerned.)

Table 23: Results of Resettlement, and Land Acquisition and Resettlement Processes

Province City	No. of households relocated	Land acquisition and resettlement processes	Role-sharing among parties concerned
Thai Binh	38	(i) Formulation of a Resettlement Action Plan (RAP) →(ii) Selection of a resettlement site →(iii) Public hearings on resettlement →(iv) Calculation of the amounts of compensation and negotiation with the residents →(v) Agreement on the RAP →(vi) Development of the resettlement site →(vii) Resettling	<u>PMU2</u> : 1. Coordination with the provinces and the city along the highway, 2. Formulation of an RAP, 3. Identification of a resettlement site <u>Provincial and municipal governments along the highway</u> : 1. Organization of public hearings on resettlement, 2. Calculation of the amounts of compensation and negotiation with the residents, 3. Development of the resettlement site (access road, electricity, water supply) <u>MOT</u> : Secure budgets necessary for acquiring land and resettling residents.
Nam Dinh	116		
Ninh Binh	57		
Hai Phong	105		
Total	316		

Source: Results from the questionnaire survey and interviews with PMU2 in the on-site survey.

A beneficiary survey was conducted on the status of resettlement and the level of satisfaction about the resettlement site. The results of the survey are provided below (in Tables 24 and 25.) No specific issue was raised in the beneficiary survey targeted at the residents. Furthermore, the interview survey focusing on the residents in the vicinity of Kien Bridge revealed that the residents subject to resettlement attended public hearings and were generally satisfied with the details of compensation.

<sup>16</sup> Interview survey was conducted to the shopkeeper (resident) along the Kien Bridge approach road during site investigation.

34 residents, equivalent to approximately 10% of the respondents to the beneficiary survey, were subject to the resettlement in conjunction with land acquisition. 23 of the resettled people were resettled in the new site while the other 11 opted for other places. They explained the reasons why not moving to the resettlement site as the narrowness of land compared to their original land and change in life. Some contributed a part of their land and moved their houses to the remaining part of the land (Thai Binh Province, Hai Phong City).

Table 24: Status of Resettlement by the Local Residents

Province City	Resettled (count)	Did not resettle (count)	Total (count)
Thai Binh	20	44	64
Nam Dinh	4	56	60
Ninh Binh	3	16	19
Hai Phong	7	163	170
Total	34	279	313

Source: Results from the beneficiary survey

Note) 23 out of the 34 respondents who were subject to resettlement moved to the resettlement site.

Of the 23 resettled people, two respondents were not satisfied with the new site because of geographical inconvenience (Hai Phong City).

The number of samples is too limited to conduct a statistically significant analysis, but no dissatisfaction or major issue was found with regard to the resettlement of residents and the resettlement site.

Table 25: Degree of Satisfaction with the Resettlement Site (N=23)

Question	Yes		No		No Idea	
	count	%	count	%	count	%
Are you satisfied with the resettlement site?	17	73.9	2	8.7	4	17.4

Source: Results from the beneficiary survey

#### 3.4.2.4 Capacity Building of Personnel Engaged in the Project (PMU2 Staff and Local Contractors)

The capacity building of personnel engaged in the project, i.e., PMU2 staff and local contractors, was achieved in the course of implementing the project, basically through on-the-job training (OJT.) Concrete outputs include (i) the ability to manage contracts in conformity to the FIDIC standards and (ii) the ability to adopt international standards for technical specifications, such as the ASTM and Japanese standards.

In the case of Kien Bridge, provided as part of the B5 package, the workers acquired techniques and skills in constructing long span cable-stayed bridges, a new technology in Vietnam, and enhanced technical implementation capacities. More specifically, training aimed at technical transfer was included in the project component: a total of approximately 150 local contractors were given technical guidance regarding designing, construction supervision, construction works and maintenance through OJT, seminars held in Hanoi and study tours to Japan.

According to PMU2, a local contractor who served as a technical assistant in the construction of Kien Bridge became the chief in the project to construct Rach Mieu Bridge in Tien Giang Province, Southern Vietnam, after the implementation of the project. Rach Mieu Bridge is of the cable-stayed structure, the same as Kien Bridge, and was funded fully by Vietnamese capital and built solely by Vietnamese construction companies. This is a good practice case that Vietnamese human resources were cultivated through technical transfer in the course of implementing the project and tapped in projects carried out by Vietnam itself.

Therefore, it is deemed that the project has brought about numerous positive impacts.

### **3.5 Sustainability (Rating: b)**

#### **3.5.1 Structural Aspects of Operation and Maintenance**

Before the implementation of the project, National Highway No. 10 was maintained by the Department of Transport of each local government in the five provinces and the city along the road, namely Quang Ninh Province, Hai Phong City, Thai Binh Province, Nam Dinh Province and Ninh Binh Province.

After the completion of the project, the responsibility for the maintenance work was transferred to the Vietnam Road Administration (VRA), under the MOT. The VRA has four Regional Road Maintenance Units (RRMU). RRMU2 is in charge of the maintenance work of National Highway No.10, as the area falls under the jurisdiction of RRMU2. Since June 2006, the unit has been outsourcing actual service delivery to Road Management and Construction Joint Stock Co. (Co.234) and assuming the supervision (contract management, progress management etc.) over the work rendered by the company. The maintenance work of the provincial roads provided as additional outputs is assumed by the Department of Transport of each respective local government. The toll collection task was, in the case of Tan De Toll Plaza, transferred from Co.234 to a private company called TASC0 in May 2009. The operation at South Hai Phong Toll Plaza is still performed by Co.234.



No specific issue was observed in terms of operation and maintenance of the roads. As stated above, RRMU2 outsources the maintenance work of National Highway No.10 to Co.234, and both organizations consider the current number of maintenance staff members as sufficient. The maintenance work is performed in accordance with the road maintenance guidelines that are set forth by the MOT and applied to national highways and provincial roads across the country. There is no particular issue in this respect.

Co.234 was founded by equitizing a state-owned enterprise under the umbrella of RRMU2. Since the staff members have now access to stock options, "There is an incentive for employees to improve the performance of the company" (according to the results from the interview survey targeted at Co.234 employees.)

Information concerning the staff of RRMU2 and Co.234 is as given below.

Table 26: Information on the Staff of RRMU2

Year	No. of staff members engaged in the maintenance work of National Highway No.10	Of these, no. of members in charge of O&M (technical staff)	Of these, no. of administrative staff
2006	85	77	8
2007	85	77	8
2008	85	77	8
2009	85	77	8

Source: Answers to the questionnaires from RRMU2

Table 27: Information on the Staff of Co.234

Year	Total no. of staff members	No. of staff members in charge of O&M of National Highway No.10 (technical staff)	Average working years of personnel responsible for O&M
2006	653	136	18
2007	658	129	19
2008	594	125	20
2009	452	132	21

Source: Answers to the questionnaires from Co.234

Currently, the VRA is being restructured. It is promoted to a higher-level organization and is now granted authority over construction works in addition to maintenance work (based on the Prime Minister's Decision proclaimed in October 2009.) While the restructuring of VRA is expected to realize a comprehensive management scheme covering from construction management to maintenance, it is vital to strengthen the organizational capacity for achieving enhanced collaboration within the organization and performing the extra roles to be assumed, in order to accomplish the initial goals set out.

### 3.5.2 Technical Aspects of Operation and Maintenance

#### Technical capacity of engineers and technical staff

Approximately 90% of the RRMU2 staff engaged in and all Co. 234 personnel responsible for the maintenance work for National Highway No.10 are technical staff. At the moment, no specific issue has been observed in terms of their technical capacity of fulfilling due tasks, such as planning, bidding, supervision and actual service delivery. The following table presents the academic backgrounds of the staff responsible for the maintenance work at both RRMU2 and Co.234.

Table 28: Academic Background of the RRMU2 Personnel (including Administrative Staff) Responsible for Maintenance Work

University graduates or higher	High school graduates	Secondary school graduates
82%	8%	10%

Source: Answers to the questionnaires from RRMU2

Table 29: Academic Background of the Co.234 Personnel (Technical Staff) Responsible for Maintenance Work

University graduates or higher	High school graduates	Secondary school graduates
7%	50%	43%

Source: Answers to the questionnaires from Co.234

#### Provision of training

As far as Kien Bridge is concerned, guidelines for maintenance work were developed as part of the project and also technical instructions have been provided by contractors. The maintenance work for long span cable-stayed bridges, however, is not yet rooted in Vietnam. The know-how on planning and bidding for large-scale repair is considered not sufficient at this point in time.

The VRA runs five technical and vocational education and training (TVET) schools at which training sessions for strengthening basic technical skills are conducted for the technical staff of Co.234 on a regular basis. These training sessions have been provided without any trouble. Thus, there is no particular issue in the aspect of training.

### 3.5.3 Financial Aspects of Operation and Maintenance

The budget for operation and maintenance costs are not adequately secured: "The budget allocated is approximately a half of what was requested as maintenance expenses. It is difficult to fulfill all road maintenance guidelines set forth by the MOT within such limited budgets" (according to hearing surveys of RRMU2, Co.234, and the Department of Transport

of Hai Phong City.) The consequence of the budgetary deficiency are pointed out as (i) the low levels of salaries of the RRMU2 staff, (ii) the lack of equipment needed for removing wrecked vehicles after accidents, and so forth.

Table 30 shows the amounts of tolls collected and expenses spent on maintenance work of National Highway No.10. The maintenance budget is allocated to the MOT by the MOF, and the MOT distributes it to its sub-organizations, including the VRA. The VRA will then determine budget allocation with consideration given to the requests submitted by RRMUs under its jurisdiction and the Departments of Transport of individual local governments based on their road maintenance plans. The maintenance costs necessary for the provincial roads and the bridges developed in the project are covered by the provincial governments' budgets.

The maintenance budgets come from revenues from tolls as well as the national budgets. The Circular 90 provisions prepared by the MOF require that the revenue from toll collection come into the national treasury; more specifically, 15% of the revenue is secured for the toll collection work, 5% is managed by the VRA as a modernization fund, and 80% enters the national treasury (MOF). Not all the revenues from toll collection in the national treasury are necessarily allocated for the maintenance budget. Table 31 presents the allocation of road maintenance budget by the MOF to the VRA. Despite the lack of data in part, the table clearly suggests that the amount of budget allocated is far less than the amount of budget requested.

Table 30: Toll Fee Revenue and O&M Expenditures Related to National Highway No.10  
(Unit: million VND)

	2006	2007	2008
Toll fee collected from National Highway No.10	30,603	31,720	35,256
Contributed to Government budget	23,721	25,417	28,231
O&M expenditures for National Highway No.10	10,267	12,398	20,665
Management and regular repair	7,859	7,950	9,258
Daily maintenance*	2,408	4,448	11,407

Source: Answers to the questionnaires from RRMU2

Note) The daily maintenance work includes markings on roads, greenery keeping along the center divider, etc.

Table 31: Budget Allocation by the MOF to VRA for Road Maintenance  
(Unit: billion VND)

	2005	2006	2007	2008	2009
Amount of budget requested	2,200	N.A.	N.A.	N.A.	2,962
Amount of budget allocated	1,002	944	1,575	2,101	2,199

Source: VRA

In Vietnam, the investment budget and the recurrent budget are controlled by the Ministry of Planning and Investment (MPI) and the MOF, respectively. The investment fund for infrastructure projects is provided mainly by donors. Thus, it is urgent to coordinate and achieve consistency.

In addition, establishing a Road Maintenance Fund has been discussed and planned as a financial source dedicated to road maintenance<sup>17</sup>; but little progress has been made in creating a concrete framework of the fund. It is important to push forward the preparation for establishing the fund.

#### 3.5.4 Current Status of Operation and Maintenance

In general, no specific issue was observed in terms of operation and maintenance. The operation and maintenance are deemed as in good state.

The roads and bridges included in the project are maintained in good condition on the whole; no specific issue has been observed. The maintenance equipment and Kien Bridge are also maintained without any particular problem. Overloaded trucks have been identified as one of the factors that will deteriorate the road pavement and bridges.

As a matter of fact, an overloaded truck was witnessed stranded on the approach road to Kien Bridge, during the on-site survey; it had failed to climb up the approach and was causing traffic congestion. The Department of Transport of each local government, which is responsible for traffic control, is now implementing various measures, including restraining illegal trucks, penalizing the drivers, and fining the truck owners. Each Department of Transport should continue to tighten the control.



An overloaded truck, which failed to move up the approach to Kien Bridge, was stranded

Some problems have been observed in terms of financial aspects of operation and maintenance; therefore sustainability of the project is fair.

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<sup>17</sup> The plan for the Road Maintenance Fund has already been approved by The Parliament within the Road Traffic Law 2008.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

While the project has been found as to have taken a longer implementation period than the original plan and some financial issues have been identified in operation and maintenance, the contents of the project are highly consistent with the country's policies and the project has brought about many positive impacts. In light of the above, this project is evaluated to be satisfactory.

### 4.2 Recommendations

#### 4.2.1 Recommendation to Executing Agencies

##### <To Improve Traffic Safety>

(Recommendations to VRA, NTSC and local governments) To reduce the number of traffic accidents, further development of infrastructure, such as setting up a center divider between the opposite bound lanes, is needed. It is also important to facilitate awareness-raising activities, such as traffic safety sessions at primary and secondary schools, safety activities in local communities, and safety promotion campaigns via mass media.

(Recommendations to local governments) All local governments along National Highway No.10 should identify all illegal structures along the highway (within the 15-meter distance on each side) and estimate a budget necessary for removing the structures. Just as importantly, they should urge the VRA and the MOT on the need for favorable budget allocation and other viable measures, in order to take a step forward to a traffic safety corridor. In urban areas, in particular, there are some old privately-owned structures; since the budget for compensating for the relocation of these property owners comes short, the removal of illegal structures is not easy. It is vital to facilitate necessary preparation and coordination for resolving such bottlenecks.

(Recommendations to local governments) Traffic control, including the overloading issue, is undertaken by the Department of Transport of each local government. While the departments are executing a number of traffic control measures, such as restraining illegal trucks (for up to 20 days), penalizing the drivers and fining the truck owners, the control measures should further be bolstered by, for example, increasing the number of personnel, in order to assure both the maintenance of and safety on the road.

##### <To Enhance O&M>

(Recommendations to VRA and RRMU2) The maintenance work for long span cable-stayed bridges is new in Vietnam. Although some training on the maintenance was

included in the project components, the know-how on planning and bidding for large-scale repair projects is still lacking. Thus, the authorities should list up all possible technical challenges, with the aid of university professors, experts and other relevant external resources, and continuously strive to build technical capacity of the staff. It is advisable to study examples of long span cable-stayed bridge construction in Japan and other countries that are advanced in constructing this structure.

(Recommendations to VRA, MOF and MOT) In pursuit of the realization of a Road Maintenance Fund, which is currently being discussed as a means to attain an adequate budget for road maintenance, the VRA should thoroughly examine a design of the fund mechanism, based on instructions given by the MOT, and submit a proposal to the MOT. In the process of the examination, the MOT should discuss the fund mechanism closely with the MOF.

(Recommendations to VRA) In principle, the construction and supervision of transport infrastructure in Vietnam is undertaken by PMUs, whereas its maintenance lies in the hands of the VRA. This context has been pointed at as a cause of difficulty in assuring sustainability after the completion of the project. The restructuring of the VRA, currently in progress, is expected to lead to an integrated road management covering from construction management and supervision to maintenance. To achieve the initial objective, however, the VRA should fortify collaboration within the organization—by, for example, installing sections and human resources dedicated to enhancing coordination and information sharing with PMUs, to be regrouped into the VRA's jurisdiction, at project implementation stage—and build the organizational capacity for fulfilling the roles to be added (construction management and supervision) through training and the like. Moreover, with the fact that Decree 12<sup>18</sup> proclaimed on February 12, 2009 stipulates "PMUs should employ personnel in charge of maintenance in advance", compliance with the decree is also desired.

#### **<To improve Project Management>**

(Recommendations to PMU2) In order to make sure that sufficient environmental and safety measures to be taken place during construction, PMU2 should reconsider selection criteria and method for contractors in order to secure necessary man-month and capacity, in accordance with the relevant TOR, when preparing bid documents and selecting contractors.

#### 4.2.2 Recommendation to JICA

##### **<To Improve Traffic Safety>**

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<sup>18</sup> Decree on Management of Investment Projects on the Construction of Works

JICA should play a leading role in the bilateral initiatives with the Government of Vietnam and in the donor community in the field of road safety, by undertaking not only initiatives between Vietnam and Japan based on specific projects but also multi-lateral frameworks, including Transport Partnership, Poverty Reduction Support Credit (PRSC) and the Joint Portfolio Performance Review Meeting composed of six banks and the Vietnamese government, in tackling traffic safety issues in a complementary and multi-tiered manner at the project, program and policy levels.

#### **4.3 Lessons Learned**

Kien Bridge constructed in the project is the very first long span cable-stayed bridge in Vietnam. It involves new techniques unique to the structure. The pertinent package included the "training and technical transfer" component, which provided programs for transferring technology to local contractors. More specifically, training, OJT-based technical transfer, study tours to Japan, seminars in Hanoi and other well-defined programs were conducted with respect to designing, construction supervision, construction works and maintenance. These efforts have resulted in higher levels of knowledge and skills related to the construction of long span cable-stayed bridges in the country. One of the visible effects is that Vietnam has replicated the technology transferred through the project in its own construction project. It is a good practice representing that the technology has spread out in the country. (See 3.4.2.4 "Capacity Building of Personnel Engaged in the Project (PMU2 Staff and Local Contractors.)")

In this way, an introduction of a new technology should be accompanied by technical assistance in the project components, in order to transfer and spread out knowledge and skills to local contractors.

End

### Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs		
Improvement of roads and bridges on National Highway No.10	<ul style="list-style-type: none"> <li>Improvement of roads and bridges from Bi Cho to Ninh Binh</li> <li>Construction of bypass in Hai Phong urban areas</li> <li>Construction of bridges and bypass at ferry crossing points and at the bridge utilized for both road and rail road</li> </ul>	<p>Same as planned</p> <p>Same as planned</p> <p>Same as planned</p> <p><u>Additional Outputs:</u></p> <ul style="list-style-type: none"> <li>Improvement of Provincial roads, bypass and bridges connecting to National Highway No.10</li> </ul>
Procurement of O&M Equipments	<ul style="list-style-type: none"> <li>O&amp;M Equipments</li> <li>Toll plazas (4)</li> </ul>	<ul style="list-style-type: none"> <li>O&amp;M Equipments: Nearly same as planned</li> <li>Toll plazas (3)</li> </ul>
Consulting Services	<ul style="list-style-type: none"> <li>Foreign engineers: 597M/M</li> <li>Local engineers: 1,211M/M</li> </ul>	<ul style="list-style-type: none"> <li>Foreign engineers: 686M/M</li> <li>Local engineers: 2,397M/M</li> </ul>
2. Project Period	March 1998 – August 2002 (54 months)	<p><u>For original outputs:</u> March 1998 – September 2004 (79 months)</p> <p><u>For additional outputs:</u> March 1998 – September 2007 (115 months)</p>
3. Project Cost		
Amount paid in Foreign currency	18,186 Million Yen	26,876 Million Yen
Amount paid in Local currency	18,337 Million Yen (1,833,700 Million VND)	883 Million Yen (883,568 Million VND)
Total	36,523 Million Yen	27,759 Million Yen
Japanese ODA loan portion	30,461 Million Yen	26,876 Million Yen
Exchange Rate	1VND= 0.01Yen (As of October, 1999)	1VND= 0.001Yen (Average for 2000)
	Note: Planned project cost is based on the appraisal of Phase II (VNVII-5) in 2000.	