No.

Ex-Post Evaluation Report of Japanese ODA Loan Projects 2009 (Vietnam)

July 2010

JAPAN INTERNATIONAL COOPERATION AGENCY

OPMAC Corporation

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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2007. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

July 2010

Atsuro KURODA
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA.

Minor amendments may be made when the volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

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Vietnam

Ex-Post Evaluation of Japanese ODA Loan Project
"Hanoi Drainage Project for Environmental Improvement (I-1) (I-2)"

Evaluator: Vietnam-Japan Joint Evaluation Team 2009

1. Project Description

Project Site

Yen So Pumping Station

1.1 Background

Hanoi, located in the Red River Delta, is the capital city and the socio-economic, political and cultural center of Vietnam. As of 1992, the city consisted of six urban districts and five suburban districts with a total area of 924.5 km^2 and a population of 2,100,000. As Hanoi is located in a lowland area surrounded by the Red River, the To Lich River and the Nhue River, historically it has suffered frequent heavy floods in the rainy season. The drainage and sewerage systems of Hanoi were very old with many of the facilities built before 1954. These had become degraded and were not well maintained, and the existing drainage capacity of the system was very much limited. Also there was no wastewater treatment plant in Hanoi. This resulted in frequent flooding, with serious economic loss and damage in the urban area as well as water quality deterioration in the rivers and lakes of the surrounding area, creating a serious problem in the urban environment and hampering economic development activities. It was under these circumstances that the Master Plan for Urban Drainage and Wastewater Disposal System in Hanoi City was prepared in 1995 by JICA.

1.2 Project Outline

The objective of this project is to control the floods in Hanoi city and improve the water quality of the rivers, lakes and reservoirs by the construction of flood works and the rehabilitation of the channel and sewage system, thereby contributing to the improvement of environmental, living and health conditions in Hanoi.

	Phase I-1 (VNII-7)	Phase I-2 (VNV-1)
Approved Amount/ Disbursed Amount	6,406Million Yen / 6,228 Million Yen	12,165Million Yen / 9,059Million Yen
Exchange of Notes Date/ Loan Agreement Signing Date	April, 1995 / April, 1995	March, 1998 / March, 1998

	Phase I-1 (VNII-7)	Phase I-2 (VNV-1)
Terms and Conditions	Interest Rate: 1.8% p.a. Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: Untied	Interest Rate: 0.75% p.a. or *1.3% p.a. Repayment Period: 40yearsor * 30 years (Grace Period: 10 years) Conditions for Procurement: Untied or *Partially Untied
Borrower / Executing Agency(ies)	The Government of the Socialist Republic of Vietnam / Hanoi People's Committee (HPC)	
Final Disbursement Date	September 2005	September 2005
Main Contractor (Over 1 billion yen)	Ebara Corporation (Japan) - Vietnam Construction & Import-Expert Corporation (VINACONEX) (Vietnam) (JV)	
Main Consultant (Over 100 million yen)	Nippon Koei Co., Ltd. (Japan)	
Feasibility Studies, etc.	F/S: February 1995, JICA	
Related Projects (if any)	Second Hanoi Drainage Project for Environmental Improvement (I)(II)	

Note: * For Consulting Services

2. Outline of the Evaluation Study

2.1 Evaluator

The Vietnam-Japan Joint Evaluation Team 2009 consisted of three Working Groups, each of which evaluated different projects. This project was evaluated by the Hanoi Drainage Group joined by the following 12 members:

Ms. Nguyen Minh Thuan, Hanoi Authority for Planning and Investment (HAPI)
Ms. Do Thị Kim Thoa, HAPI
Mr. Le Sinh Tien, HAPI
Mr. Do Anh Tuan, Hanoi Sewerage Drainage Project Management Board (HSD-PMB)
Mr. Nguyen Van Quy, HSD-PMB
Ms. Ha Thị Hong Van, HSD-PMB
Ms. Nguyen Thị Thuy Nga, Hanoi Sewerage and Drainage Company (HSDC)
Ms. Nguyen Thanh Huong, Ministry of Planning and Investment (MPI)
Ms. Luong Lan Dung, Evaluation Advisor[1] / National Power Transmission Corporation
Mr. Keishi Miyazaki, External Evaluator / OPMAC Corporation
Mr. Nghiem Ba Hung, National Consultant / PeaPROs
Mr. Le Quang Trung, National Consultant / PeaPROs

2.2 Duration of Evaluation Study

Duration of the Study: September 2009 – June 2010
Duration of the Field Study: January 2010 – March 2010

2.3 Constraints during the Evaluation Study

There were difficulties in collecting statistical data relating to key outcome indicators, including

[1] In order to promote a leading role for the Vietnamese evaluation members, an evaluation advisor who had participated in the joint evaluation in 2008 was invited to the working group.

flood damage costs and the number of water-born diseases in Hanoi, due to unavailability of data as well as the reluctance of the related agencies to disclose information.

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

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Vietnam

At the time of appraisal, the Five Year Socio Economic Development Plan (SEDP) 1996-2000 stated that the necessity to gradually improve the water supply and sewerage in urban centres, giving priority to areas still without such systems.

Based on the JICA Master Plan on Urban Drainage and Wastewater Disposal System in Hanoi City (1995), a revised Master Plan was officially approved by the Vietnamese government in 1998.[2] The development of drainage and sewerage systems in Hanoi was programmed in accordance with the revised Master Plan. This target project was planned in the initial phase of the Master Plan described as the "To Lich River Basin Drainage Plan", which aimed at urgent solution for the existing serious flooding in Hanoi (see Table 1). This project was clearly identified and prioritized in the Hanoi SEDP 1996-2000.

At the time of the ex-post evaluation, the SEDP 2006-2010 stated that improvement of drainage systems, sewerage treatment and solid waste water treatment in urban areas should be made in the Chapter 6, 2. investment orientation and the development of infrastructure for industries and sectors, and the Second Hanoi Drainage Project for Environmental Improvement (I) (II), which is the second phase of this target project, is listed among the ODA projects to be implemented during 2006-2010. Development of drainage systems was an important priority in the Hanoi SEDP 2000-2010, which emphasizes the importance of creating synchronization and modernization in the entire drainage system together with improvement of living standards, of flood control after a rainfall of 310 mm per 2 days, and of the city environment. Also, the National Strategy for Environmental Protection to 2010 and the Vision 2020[3] stress the rehabilitation and strengthening of drainage systems in big cities and industrial areas. In addition, in the Comprehensive Urban Development Programme in Hanoi City (HAIDEP)[4] prepared in May 2007 by JICA, flood control in Hanoi is a priority area.

Table 1: Outline of the Master Plan on Urban Drainage and Wastewater Disposal System in Hanoi City (1995)

Project	Outline
I. Drainage Plan	
A. To Lich River Basin Drainage Plan	• Development of drainage area 77.5km^2 by 2004.
B. Nhue River Basin Drainage Plan	• Development of drainage area 57.9km^2 by 2015.
C. Sewer/Channel Drainage Works	• Execution of drainage works for the existing combined sewer (120km) and channels (31km), initiated by the procurement of machinery.
D. West Lake Conservation	• Execution of the West Lake Comprehensive Environment Study, proposed separately.

[2] Decision No. 108/1998/QD-TTg issued on June 20, 1998 by the Prime Minister.

[3] Decision No. 256/2003/QD-TTg.

[4] HAIDEP was prepared in May 2007 by JICA for the purpose of revising the existing Urban Development Master Plan of Hanoi up to 2020, approved in 1998.

Project	Outline
E. City Lake Conservation	• Implementation of shoreline revamping works for 50 lakes and environmental conservation works for 20 lakes in the long term.
II. Wastewater Disposal Plan	
H. Centralized Treatment System	• Development of 5 zones with a public sewerage system by 2020.
I. On-site Treatment System	• Installation of community plants and/or septic tanks in 2 zones.
J. Pilot Wastewater Treatment Projects	• Formulation of some pilot projects for advance implementation prior to the implementation of the centralized treatment systems which would commence after 2020.
K. Flushing Water Diversion Plan	• Presentation of a preliminary plan to convey Red River water.
III. Non-structural Measures	• Recommendation of institutional/financial measures to support the drainage/sewerage development plan.

Source: The Study on Urban Drainage and Wastewater Disposal Systems in Hanoi City, Final Report, Executive Summary, February 1995, JICA.
Note: The projects of "A. To Lich River Basin Drainage Plan" and "J. Pilot Wastewater Treatment Projects" are to be implemented by Hanoi Drainage Project for Environmental Improvement (I-1) (I-2).

3.1.2 Relevance with the Development Needs of Vietnam

At the time of appraisal, Hanoi frequently suffered heavy floods in the rainy season due to its location on lowlands surrounded by the Red River, the To Lich River and the Nhue River. A major flood covering almost the entire city happened every 4-5 years, with a minor flood occurring every year. The existing drainage and sewerage system was old, with 80km out of 120km (total length) built before 1954. This system was falling into a state of disrepair with conveyance capacity reduced. The existing rivers, lakes and reservoirs were also filled with sediment which reduced their carrying capacity. In addition to this, there was no wastewater treatment plant in Hanoi. This all resulted in frequent flooding with serious economic loss and damage in the urban areas as well as a deterioration of water quality in the rivers and lakes of the surrounding area, creating serious environmental problems and hampering economic development activities. Therefore, the improvement of the existing drainage and sewerage systems was urgently required.

At the time of the ex-post evaluation, even though the drainage systems have been significantly improved and inundation mitigated in many places in Hanoi, there are spots where floods still occur and where it takes a long time to drain water. Some areas are still seriously flooded due to a lack of synchronized infrastructure development that requires a more comprehensive and larger-scale investment. In addition, the current urbanization and expansion of the city area together with population growth causes increase of wastewater and the necessity of a more synchronized and larger drainage system. Therefore, further development of the drainage and sewerage systems in Hanoi is still highly necessary.

3.1.3 Relevance with Japan's ODA Policy

At the time of appraisal, the Japanese Country Assistant Program for Vietnam was not yet established. According to Japanese government aid policy, objectives for operations in Vietnam were (i) support for macro-economic stability, (ii) support for the transitional economy, (iii) support for economic infrastructure development, (iv) support for human resource development, (v) support for social issues and (vi) support for environmental protection. In particular, regarding (iii) support for economic infrastructure development, priority was given to the power,

transport and environmental sectors.

At the time of the ex-post evaluation, the existing Japanese aid policy, the Country Assistance Program for Vietnam, established in July 2009, sets the basic assistant policy as (i) promotion of economic growth and strengthening of international competitiveness, (ii) improvements in living and social conditions and corrections of disparities, (iii) environmental conservation, and (iv) strengthening of governance. In particular, regarding (iii) environmental conservation, priority has been given to urban environmental management, including support for construction and the improvement of facilities related to water quality management, water supply, wastewater and sewage treatment, solid waste management and air environment control.

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

The main feature of the planned outputs was the expansion of drainage capacity in the target area of Hanoi city (7,750ha)[5] through the construction of a pumping station to discharge flooded water into the Red River, together with the rehabilitation and improvement of the existing lakes, rivers, reservoirs, channels and sewers. In addition to this, the installation of two small-scale pilot waste water treatment plants was another important component. The pilot plants tested the appropriateness of newly introduced treatment technology (i.e. the activated sludge method) in Hanoi, which under consideration for application to full-scale sewerage system development in the future. Furthermore, capacity development for the O&M staff of this project was incorporated in the outputs to enhance the effectiveness and sustainability of this project. The outputs originally planned were mostly realized with some modification and additional scope. Table 2 shows a comparison of the planned and actual outputs.

The reason why the number of bridges and culverts constructed for river improvement decreased from 29 to 7 in package 2 was that some of the locations were removed from the target area due to overlapping with other on-going urban development projects of the HPC. Some of these ongoing projects were already constructed during implementation of this project. Also 6 km of road construction along the To Lich River was added to the project scope with the intention of improving road traffic and living conditions and urban scenery. The amount of procured equipment in package 7 was increased based on a request for the procurement of additional equipment from the Project Management Board (PMB) of this project as PMB realized that equipment bought in the first batch worked effectively and they wanted to have more equipment in consideration of the sustainable operation and maintenance of this project after the project completion.

The reasons for the increase in the work volume of consultants were: (i) frequent changes in some work items, tasks and the scale of the project at the time of detailed design; (ii) the prolonged construction period, and (iii) additional scope for reexamination of the feasibility study of this project as well as preparation work for the feasibility study of the second phase of this project.

[5] The project target area of 7,750 ha includes (i) 3,738 ha of urban districts (Dong Da, Ba Dinh, Hoan Kiem, and Hai Ba Trung), (ii) 3,445 ha of sub-urban districts (Thanh Tri and Tu Liem), and (iii) 567 ha of the West Lake Area.

Table 2: Comparison of Planned and Actual Outputs

Items	Plan	Actual
1. Construction of the Yen So Pumping Station cluster	• Construction of the Yen So Pumping Station: capacity 45m^3/s • Construction of regulating reservoirs: storage capacity 4.9 mil. m^3 • Spillways: 3 • Inlet channel: 1.2km • Outlet channel: 1.6km • Yen So channel: 3.4km • 8 bridges and 6 culverts	• Same as planned except the number of culverts was reduced from 6 to 5.
2. River improvement	• Dredging and embanking of the To Lich River, the Lu River, the Set River, the Lu-Set floodway, and the Upper and Lower Kim Nguu River (total length 33.8km) • Construction of 29 bridges and culverts	• Dredging and embankment took place almost as planned (total length 31.1km). • Construction of 7 bridges and culverts • Additional: 6km road construction along the To Lich River
3. Construction of flood and control gates	• 7 locations	• Same as planned
4. Lake improvement	• Dredging of 4 lakes (Giang Vo, Thanh Nhan 1, Thanh Nhan 2a, Thanh Nhan 2b) • Aeration applied in Thanh Cong Lake and Thien Quang Lake	• Same as planned • Dredging of Thanh Cong Lake and Thien Quang Lake was implemented instead of aeration
5. Drainage channel improvement	• Construction of bridges and culverts at 54 locations	• Same as planned
6. Construction and rehabilitation of Sewers	• West Lake basin, To Lich basin, Set River basin, Upper Lu River basin, and Kim Nguu River basin	• Same as planned
7. Construction of pilot waste water treatment plants at Kim Lien and Truc Bach	• Capacity of Kim Lien WWT plant: 3,700m^3/day • Capacity o Truc Bach WWT plant 2,300m^3/day • Applied technology: Activated sludge method	• Same as planned.
8. Procurement of dredging equipment and facilities	• 1 batch/package of 63 equipment units	• 1 batch as planned, and 1 additional package (total 88 equipment units)
9. Development of resettlement area	• 10.3ha at the Dong Tau resettlement zone	• 10.8ha
10. Training	No. of staff trained: 377 • O&M of Yen So Pumping Station: 34 • O&M for drainage systems: 288 • O&M for WWT plants: 55	• Same as planned
11. Consultant services	• International consultant: 368 M/M • National consultant: 1,092 M/M	• International consultant: 507.8 M/M • National consultant: 1,651.9 M/M

Note: The components of lake improvement, construction of pilot waste water treatment plants and the construction of the resettlement area were added during the appraisal of VNV-1.

Photographs of Selected Project Outputs

Yen So Pumping Station

Yen So Channel

Spillway B at Yen So Pumping Station

Upper Kim Nguu River

Thanh Liet Flood and Control Gate

Bridge

Thien Quang Lake

Kim Lien WWT Plant

Procured Equipment

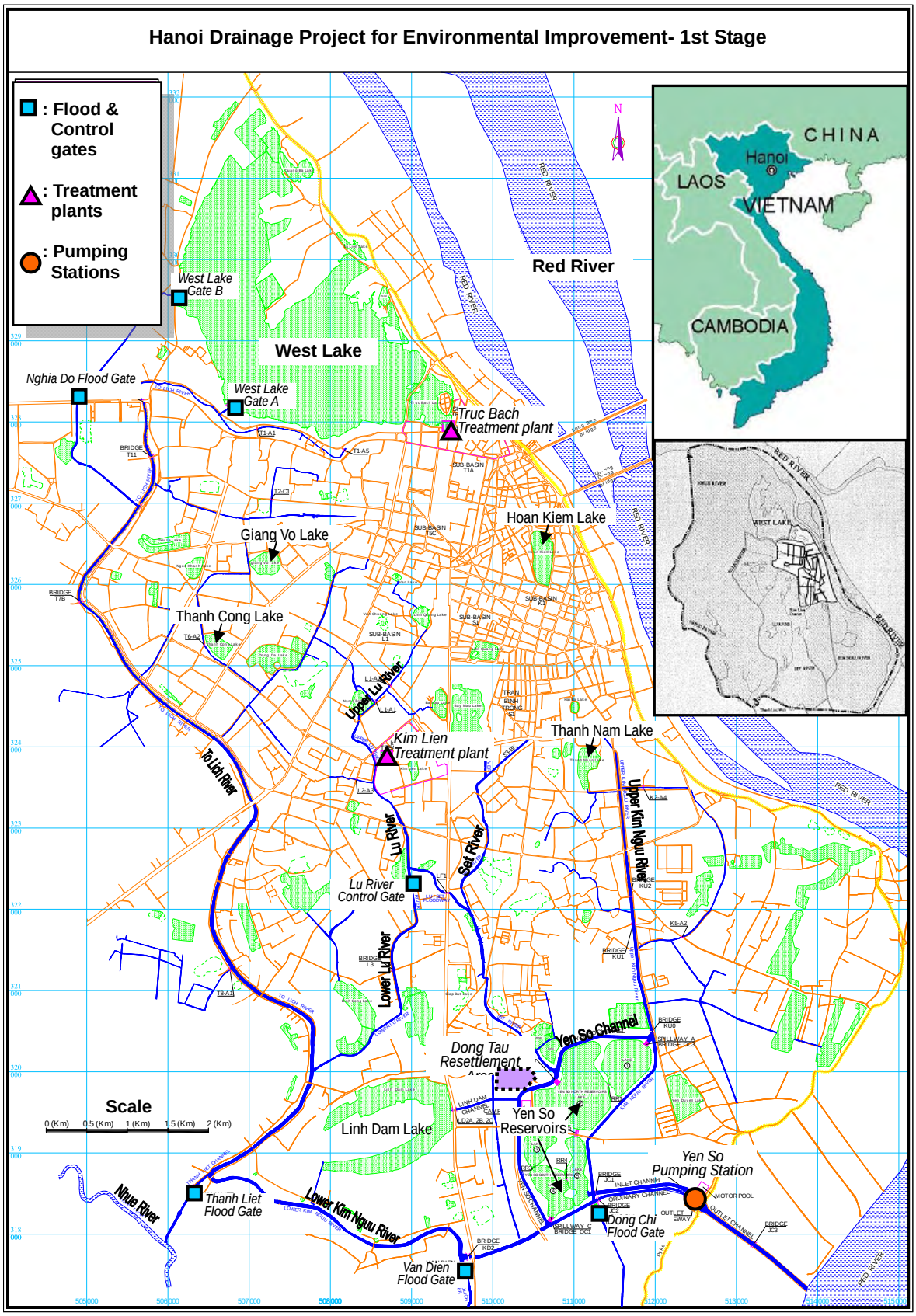
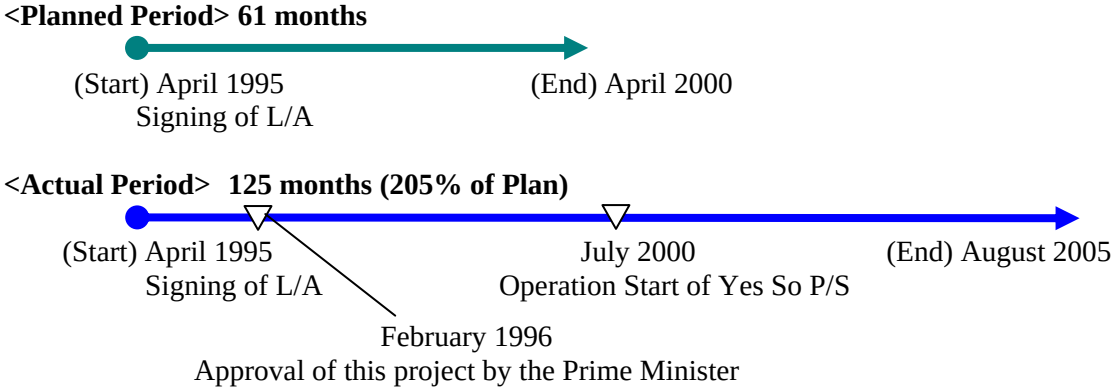


Figure 1: Project Site Map

3.2.2 Project Inputs

3.2.2.1 Project Period

The actual implementation period was 125 months (from April 1995 to August 2005) against 61 months of the planned project period (from April 1995 to April 2000), which was significantly longer than planned. The actual project period meant a 64 month delay or a 105% period longer than planned.



There were five main reasons for the delay in this project. First, administrative procedures of the executing agency were prolonged due to a lack of experience in the implementation of a Japanese ODA loan project and understanding of the regulations and guidelines of JICA, as well as complicated administrative procedures among the project related organizations in Vietnam[6]; (ii) delays in detailed design caused by delays in the detailed city plan of Hanoi[7], adjustment of the design[8], increases in the number of contract packages[9] and inadequate performance on the part of the consultant; (iii) delays caused by local contractors due to lack of capacity[10], difficult geographic conditions at some project locations and adverse weather conditions[11] and the

[6] HPC and PMB took a lot of time to deal with the problems arising from the differences in approval procedure and procurement system between the Vietnamese government and JICA since this project was the first Japanese ODA loan project for HPC. For instance, the selection of consultant was not be completed until November 1997 after signing of the Loan Agreement in April 1995, which was a delay of almost 2 years delay.

[7] At that time, the Hanoi Chief Architect (HCA) in charge of city planning in Hanoi city was preparing the "Hanoi Master Plan toward 2020". However, detailed city plans of respective planning areas had not yet been completed, which seriously affected the progress of the detailed design of the project as detailed designs had to be prepared based on planning data provided by HCA, while project boundaries had to be approved by HCA.

[8] Some examples of adjustments to the design were: (i) change of height of the Truc Bach wastewater treatment plant by lowering the underground treatment tanks and the elevation of the control center, and (ii) additional items for lake improvement such as construction of a water fountain and the walkways around the lakes.

[9] At the time of appraisal of Phase I-1 (VNII-7) in 1995, the number of planned tender lots was 6, consisting of (i) the supply of equipment for urgent rehabilitation work, (ii) site preparation work, (iii) main civil works including hydro mechanical equipment, (iv) bridges on drainage channels, (v) lake dredging, and (vi) sewer construction. Procurement methods for these 6 lots were: international competitive bidding (ICB) for (i) and (iii), limited local competitive bidding (LCB) for (iv)(v) and (vi), and direct appointment of local contractors for (ii). However due to a lack of capacity of the local contractors as well as additional scope through the appraisal of Phase I-2 (VNV-1) in 1998, the planned 6 tender lots were segmentalized into 18 lots in order to meet the capacity of the contractors, particularly the Vietnamese contractors. As a consequence contracting management became complicated and time consuming.

[10] According to the SAPI report, these inappropriate local contractors were mostly awarded through the limited LCB.

[11] As the site of the outlet sluiceway civil work in package 4 was close to the dyke of the Red River, work was not allowed during rainy season for the safety of the dyke. In addition, the ground condition of the Yen So area was unstable and with a high level, which affected the progress of the works. Furthermore, storm weather in the rainy season sometimes caused a flood in the city, which impeded the progress of the civil works in many of the packages.

typical characteristics of works inside the inner city[12]; (iv) delays in land acquisition due to delays in obtaining project boundary approval and difficulties in compensation negotiations with affected households[13], and (v) additional time required for preparing the feasibility study for phase 2 of this project which was an additional scope for the consulting services.

According to the Study Report on Special Assistance for Project Implementation (SAPI) for this project in 2000, inappropriate management by the Project Management Board (PMB)[14] and the Hanoi People's Committee (HPC)[15] delayed the project implementation. The SAPI report pointed out that, for example, although PMB was empowered by HPC under the Decision by the Prime Minister[16], in practice PMB decision making on any aspect of project management was limited because of PMB's position in the organizational structure of HPC being at a lower level than the other related organizations communicated with the project implementation. Coupled with the shortage of capable staff in PMB and limited capacity in coordination and communication with related organizations, this management issue of PMB affected project implementation. Similarly, due to a misunderstanding of the roles and responsibilities of the executing agency by HPC, HPC did not play a proactive role in overall project management as well as suffering from limited staff capacity.

Based on the recommendations from the SAPI, a number of actions have been taken by GoV, HPC, HAPI, TUPWS and PMB to improve their institutional capacity through the establishment of specialized divisions under HPC, the issuance and adjustment of Government Decrees and regulations, training for PMB staff, regular meetings for sharing information, regulations on administration procedures, decentralization of project approval authority, etc.

3.2.2.2 Project Cost

The actual project cost was 21,227 million Yen against 22,887 million Yen of the planned cost, which was mostly as planned (Table 3). The actual cost for land acquisition and compensation exceeded the planned cost about three times despite the fact that the total acquired land area decreased from 504 ha to 470 ha. This was because the policy and regulations for land acquisition and compensation were changed several times by HPC during the project implementation together with the increase in the compensation rate. The actual cost for land acquisition and compensation was also larger than the original estimation. However this was balanced out by additional counterpart funds as well as cost saving from the construction works.

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[12] As the site of sewer rehabilitation and construction in package 2 was located in the inner city, the works had to be done during night time. In addition, the sewer was laid down in narrow streets and alleys. Therefore, the works were difficult and time consuming.

[13] This project covered a large area of Hanoi city including the inner districts of Ba Dinh, Dong Da, Hai Ba Trung, Hoan Kiem (old districts), Thanh Xuan, Tay Ho, Cau Giay (newly established), and the suburb districts of Thanh Tri and Tu Liem. During implementation, there were many difficulties in land acquisitions such as in the compensation policy and procedures, identifying the number of affected households and insufficient operation of the agencies responsible. The actual period for land acquisition and resettlement was 103 months (from February 1997 to August 2005) against 47 months (from July 1995 to May 2000).

[14] The SAPI report concluded that the inappropriate management of PMB was caused by factors such as the low status of PMB, a shortage of capable staff and insufficient capabilities of staff, insufficient communication with the organizations concerned.

[15] The SAPI report concluded that the inappropriate management of HPC was caused by factors such as inappropriate understanding of the "Executing Agency", inappropriate overall management systems, and a lack of supporting organization and staff.

[16] Decision No. 112/TTg dated February 15, 1996 by the Prime Minister.

Table 3: Comparison of Planned and Actual Project Costs

Items	Plan*			Actual		
	Foreign Currency (Mil. JPY)	Local Currency (Mil. VND)	Total (mil. JPY)	Foreign Currency (mil. JPY)	Local Currency (Mil. VND)	Total (mil. JPY)
1. Construction works	10,605	340,547	14,010	11,194	110,00	12,074
2. Dredging equipment	1,198		1,198	1,162		1,162
3. Consulting services	882	53,098	1,413	2,066		2,066
4. Contingency	1,114	58,375	1,698			0
5. Price escalation	351	15,438	505			0
6. Administration costs	1,010	75,200	1,762		60,000	480
7. Land acquisition and compensation		178,100	1,781		605,000	4,840
8. Import taxes		51,900	519		110,000	880
Total	15,160	772,658	22,887	14,422	885,000	21,227

Note 1: Planned project costs are based on the cost estimation at the appraisal of Phase I-2 (VNV-1) in 1998.
Note 2: Exchange rate used: 1 VND = 0.010 JPY in 1997 for planned cost, 1 VND= 0.008 JPY in annual average between 1995 and 2005 for Actual cost.

Although the project period was significantly longer than planned, the project cost was mostly as planned, therefore efficiency of this project is fair.

3.3 Effectiveness (Rating: a)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

(1) Reduction in Inundation Time

Table 4 indicates inundation time in Hanoi on selected days of heavy rain, and suggests that inundation time was dramatically reduced after 2001. For example, there were 7 days of inundation time in Hanoi when it experienced 248.8mm rainfall in 2 days from May 19 to 20, 1994. However, there were 2 days of inundation time in 2001 when the rainfall was 306.5mm during August 3-4, 2001. When the rainfall level is less than 200mm, flooded water is usually drained within 2-3 hours. Although the project was completed in August 2005, the project effects were observed after 2000 when the Yen So Pumping Station started operation. An exceptional case was the three days of heavy rain during October 31 and November 2, 2008, which was the heaviest rain in Hanoi since official recording started in 1960. It took 5 days to draining the water.

In general, before the completion of this project, many places had 3-5 days inundation after heavy rains. At present, floods occur in 2-3 hours after rain with similar intensity.

According to data from the Hanoi Sewerage and Drainage Company (HSDC), the annual average inundation before the completion of this project was 0.5-0.8m with a draining time of 1-2 days after rains exceeding 50mm. After project completion, the annual average inundation has become 0.2-0.3m and the draining time 0.5-1 hour after the same amount of rain. The primary target of this project, which was to improve the drainage systems of the target area in Hanoi dealing with 172mm per 2 days of rainfall with a return period of 2 years, has been achieved.

This result was due to the improvement of the drainage systems in the target area of Hanoi through this project. Before the project, the total drainage system of Hanoi was operated

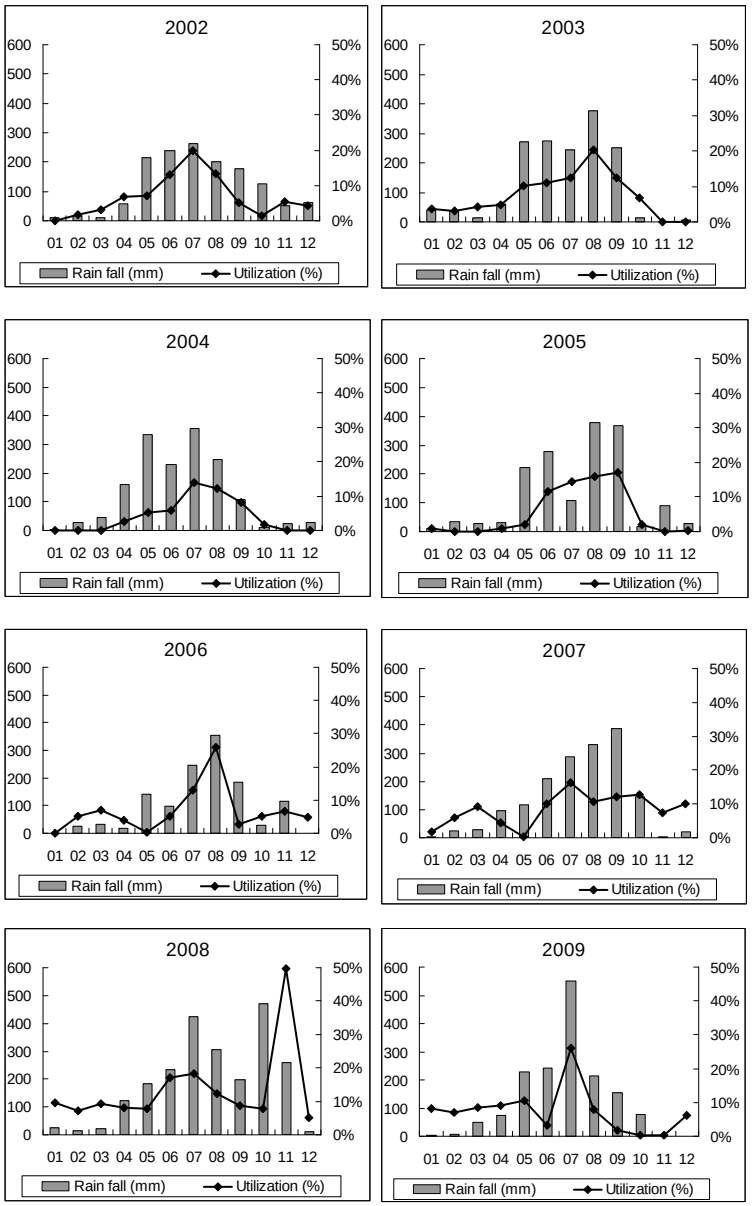
through natural gravity, where water flowed through the Nhue River to the Thanh Liet flood gate. The highest rate of flow was 15m^3/s, but this worked only when the natural water level in the Nhue River was lower than the water level in the To Lich River. After completion of this project, the newly constructed Yen So Pumping Station, with a maximum capacity of 45m^3/s, helped to discharge water into the Red River, particularly in the rainy season. As shown in Figure 2 below, utilization of the Yen So Pumping Station increased during the rainy season between May and October.

Table 4: Table 4: Inundation Time in Hanoi on Selected Days of Heavy Rain

Date (d/m/y)	Rainfall (mm)	Inundation time (days or hours)
Target	172 per 2 days	-
11/06/1991	121.4	7 days
12/06/1991	79.3	
	200.7	
29/06/1992	68.4	8 days
30/06/1992	165.3	
	233.7	
29/09/1993	36.7	5 days
30/09/1993	143.4	
	180.1	
19/05/1994	69.2	7 days
20/05/1994	179.6	
	248.8	
04/11/1996	48.2	5 days
05/11/1996	145.3	
	193.5	
25/06/1998	48.5	6 days
26/06/1998	148.0	
	196.5	
15/07/1999	150.9	3 days
03/08/2001	169.8	2 days
04/08/2001	136.7	
	306.5	
27/09/2005	**144.1**	2 hours
16/07/2008	95.3	2 hours
18/07/2008	135.6	3 hours
	230.9	n.a.
31/10/2008	347.0	5 days
01/11/2008	128.2	
02/11/2008	88.1	
	563.3	
17/07/2009	**119.2**	2 hours

Source: Hanoi Department of Construction.

Note: Inundation time from 31/10/2008 to 02/11/ 2008 is based on information from the local newspaper.



Source: Hanoi Sewerage and Drainage Company (HSDC).

Note: Utilization (%) = Actual pumped water volume per month / Maximum pumped water volume per month x 100

Figure 2: Operation of theYen So Pumping Station (2002-2009)

In addition to the operation of the Yen So Pumping Station, improved carrying capacity of existing drainage, including rivers, channels, culverts, and tubes as well as the newly constructed 5 reservoirs, and the dredged 6 lakes and reservoirs was increased to a total 5.3 million m^3 by this project (Table 5).

Table 5: Status of Drainage Systems in Hanoi

	1997	2005
Total length of drains	262.53 km	513.99 km
Total length of channels	32.5 km	89.1 km
Total length of rivers	38.9 km	45.8 km

Source: Hanoi Sewerage and Drainage Company (HSDC).
Note 1: The figure provided above is for the area under the control of HSDC.
Note 2: The expanded length of drains, channels, and rivers was for 1997 to 2005 can also be attributed to other projects.

Since 2006, the Second Hanoi Drainage Project for Environmental Improvement (I) (II) has been implemented by the HPC using a Japanese ODA loan, based upon the master plan. This second phase project provides an additional 45m^3/s capacity in the Yen So Pumping Station, wastewater treatment plants with a capacity of 13,300m^3/day, the rehabilitation and improvement of 10 lakes and 2 reservoirs, drainage and sewerage channels and so on. It is envisaged that the second phase project will solve the problem of inundation with a rainfall of 310 mm per 2 days and with a return period of 10 years.

(2) Operation of Pilot Wastewater Treatment Plants

Two small-scale wastewater treatment plants were constructed through this project at Kim Lien and Truc Bach, for the pilot application of "activated sludge technology" in Hanoi. This was an important milestone as there were no such wastewater treatment plants in Hanoi in the past. The performance of the pilot plants were utilized in consideration of the development of full-scale wastewater treatment plants in future projects, including the on-going phase 2 of this project.

Since the start of operations in 2005, the two pilot plants have been performing well and they achieved almost 100% of facility utilization in 2008. The elimination efficiency of treated water at the outlet is 87%, which meets the requirement of 85% stipulated in government environmental standards (Table 6).

Table 6: Operation of Pilot Wastewater Treatment Plants

Plant	Item	2005	2006	2007	2008
Kim Lien Capacity: 3,700m^3/day	Average daily treated water volume (m^3/day)	2,743	3,247	3,641	3,700
	Plant utilization (%)	74.1	87.8	98.4	100.0
Truc Back Capacity: 2,300m^3/day	Average daily treated water volume (m^3/day)	2,300	2,300	2,300	2,300
	Plant utilization (%)	100.0	100.0	100.0	100.0

Source: Hanoi Sewerage Drainage Company (HSDC).
Note: The operation of Kim Lien and Truc Back wastewater treatment plants started from September 2005.

According to the HPC and HSDC, the performance of the two pilot wastewater plants proved the newly introduced activated sludge technology to be adaptable in Hanoi. Also, through operation and maintenance of the pilot plants, the technical capacity of HSDC staff has been improved in terms of the management, operation and maintenance of wastewater treatment plants.

After this project, the Hanoi authority promoted the further development of wastewater treatment plants in line with the Hanoi Master Plan toward 2020. Four new wastewater treatment plants[17] are to be constructed in the city, including a wastewater treatment plant at Thong Nhat Park with a capacity of 13,300m^3/day under the second phase of this project. All of the new wastewater treatment plants are to apply activated sludge technology.

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

At the time of appraisal, cost-benefit analysis of this project was examined and the Economic Internal Rate of Return (EIRR) of this project was found to be 17.3%. This calculation was based upon the preconditions below:

(Costs) Project cost and O&M cost

(Benefit) Decrease of flood damage and improvement of living and hygiene conditions.

Due to the fact that data needed for quantitative analysis was not available, analysis for the internal rate of return of the time of ex-post evaluation was not possible.

3.3.2 Qualitative Effects

(1) Capacity Development of O&M Staff

For the purpose of capacity development, this project provided technical training for the O&M staff of HSDC as well as for PMB staff. As indicated in Table 2, a total of 377 people benefitted from training, including 34 engineers and staff for O&M training at the Yen So Pumping Station, 288 engineers and staff for O&M training for drainage systems and 55 engineers and staff for O&M training at the pilot wastewater treatment plants. They took both theoretical and practical courses and examinations to check their understanding and they received certificates after completion.

According to the results of a Focus Group Discussion with 10 HSDC staff, including managers and engineers from different departments, “improved performance and effectiveness” and a “deeper understanding of the requirements of the current work/job” were commonly perceived as advantages. Other advantages were “increased working productivity” and “increased advanced knowledge of the work”. According to the HSDC self-evaluation on the effect of capacity development which was obtained through the questionnaire and interview survey with HSDC, the technical capacity and skills of trained HSDC staff had improved. It was commented that trained staff had played the main role in transferring knowledge and skills to the other staff in the organization as well as in operating and maintaining the modern equipment provided by this project.

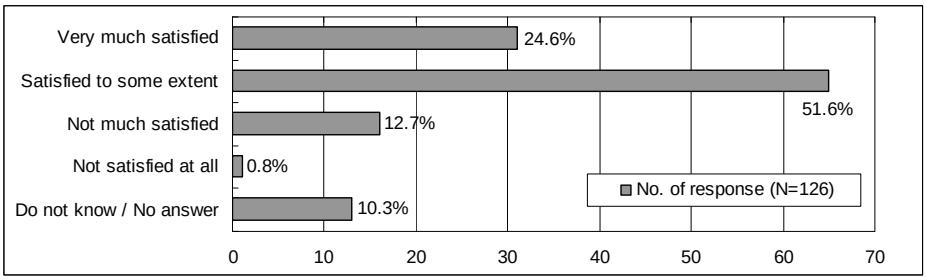
(2) Satisfaction of Beneficiaries

According to the results of the satisfaction survey for beneficiaries which included 103 Hanoi residents[18], 12 commercial and business companies, 5 transport companies, 3 health clinics, and

[17] These are (i) the Yen So wastewater treatment plant with a capacity of 190,000m^3/day in Hoang Mai district (on-going) which is a BT (Building-Transfer) project of a Malaysian investor, (ii) the Phu Do wastewater treatment plant with a capacity of 71,000m^3/day in the Tu Liem district (pipe-line), (iii) the Yen Xa wastewater treatment plant with a capacity of 275,000m^3/day in the Thanh Tri district (pipe-line), and (iv) a wastewater treatment plant at Thong Nhat Park with a capacity of 13,300 m^3/day in the Hai Ba Trung district (on-going).

[18] Out of 103 samples, 53 samples (51%) were selected from the heavily flooded area within the project target area in Hanoi including Phuong Liet Ward, Tan Mai Ward, and Thanh Liet Ward, and 50 samples (49%) were selected from the relatively less flooded area including Dong Tam Word, Khuong Dinh Ward, Khuong Trung Ward, Thanh Xuan Ward, Truong Dinh Ward, and Tuong Mai Ward. The target Wards of this beneficiary survey were randomly selected with the consideration of their population size and the locations of the project facilities. However, the selection of the sample households in each word was not randomly done but the sample was selected from a list of candidate households who were selected by each ward in advance due to the limited field survey period and some Vietnamese political reasons.

3 schools, 24.6% of respondents (31 respondents) said that they were “Very much satisfied” and 51.6% of respondents (65 respondents) said that they were “Satisfied to some extent” (Figure 3).



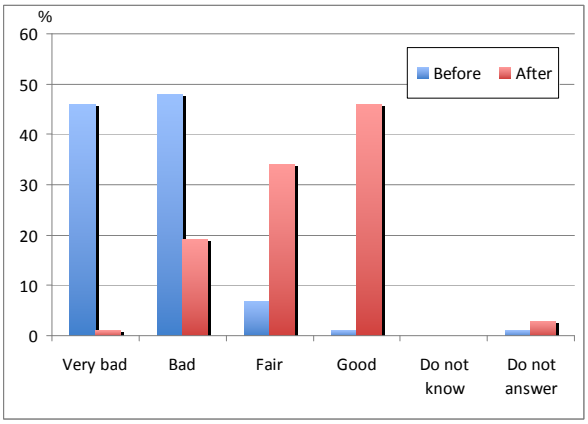
Source: The results of a beneficiary survey conducted by the joint evaluation team.
Note: Out of 126 responses, 103 are from Hanoi residents, 12 are from commercial and business companies, 5 are from transport companies, 3 are from health clinics, and 3 are from schools in the project area.

Figure 3: Satisfaction of Beneficiaries

A total of 103 Hanoi residents were asked to assess the condition of the drainage systems in Hanoi, comparing the situation before and after project completion, and the results of their responses are shown in Figure 4. Before project completion, 44.7% of respondents (46 respondents) and 46.6% of respondents (48 respondents) perceived the drainage systems to be “very bad” and “bad” respectively. Their assessment after project completion, however, was reversed. Now 44.7% (46 respondents) answered “Good” and 33.0% (34 respondents) said “Fair”.

The above results suggest that the effects of this project have been commonly recognized by Hanoi residents and also that this project has met the needs of the beneficiaries. At the same time, despite the improved drainage conditions, there still exists a great demand among local residents for further improvement of the drainage and sewerage systems in Hanoi, including better water quality of rivers and lakes in the city.

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



Source: The results of a beneficiary survey conducted by the joint evaluation team.
Note: Total number of respondents: 103 Hanoi residents.

Figure 4: Perception of Beneficiaries on Drainage Conditions before and after the Project

Photographs of Beneficiary Survey

Interview to a Hanoi resident

Interview to a clinic

Interview to a primary school

3.4 Impact

3.4.1 Intended Impacts

(1) Impact on the Decrease of Flood Damage

According to the results of the beneficiary survey with 103 Hanoi residents, 69.9% of respondents (72 respondents) perceived a decrease in loss caused by floods after project completion. Some of the transport companies interviewed reported fewer losses caused by vehicle damage and loss of customers during the floods, as well as a reduction in maintenance costs of damaged vehicles after the project. Businesses used to suffer considerable damage to workshops, machinery and products, but the frequency of this has decreased. Many of the beneficiaries interviewed recognized a decrease in flood damage in comparison with the situation before project completion. However, due to the unavailability of statistical data for the costs of damage and loss caused by floods in Hanoi, the degree of impact can not be analyzed in a quantitative manner.

(2) Impact on the Improvement in Health and Living Conditions

Firstly, according to the results of the beneficiary survey with 103 Hanoi residents, 68.9% of the respondents (71 respondents) asserted that water-borne diseases had decreased. However, a half of the respondents in Phuong Liet Ward (53.8%) and one third of the respondents in Thanh Liet Ward (33.3%) claimed an increase in water-born diseases. This may be because these areas still have some swamps. According to an interview survey with three health clinics, a positive impact on health and hygiene conditions was perceived in the respective areas. Tan Mai Clinic observed that there had been a decrease in the number of patients with water-borne diseases in their area. However, due to the unavailability of statistical data, a direct link between the decrease in water-born diseases and this project is uncertain and a further detailed technical study is necessary.

Secondly, 83.5% of respondents (86 respondents) said that there had been an “improvement in hygiene conditions” and 77.7% of respondents (80 respondents) stated that a “decrease in the appearance of mosquitoes had affected people’s living comfort following project completion.

Thirdly, improvement in traffic conditions was perceived by most respondents as a positive impact of this project (60.2% of respondents). Some of the schools and transport companies interviewed had a similar perception. This is because a large part of the rivers and open channels of Lu and Set were now covered by box culverts and culverts, with roads built on top. Traffic conditions improved in many of the locations where this project constructed paved roads in Hanoi, both in terms of improvements in accessibility to the roads as well as an increased number of vehicles.[19]

[19] About one third of the respondents in Khuong Trung and Phuong Liet wards still stated that traffic conditions had worsened. Especially in Tuong Mai and Thanh Liet where traffic flow had been changed, traffic conditions were ranked unchanged.

In sum, it is likely that this project has contributed to some aspects of an improvement in some aspects of living conditions, especially hygiene conditions and transport convenience.

(3) Impact on the Natural Environment

The Environmental Impact Assessment (EIA) of this project excluding the pilot wastewater treatment plants was approved by Ministry of Science, Technology and Environment (MOSTE)[20] in October 2002. The EIA of the pilot wastewater treatment plants was approved in July 2003 by HPC which received delegated responsibility from MOSTE. According to the Environmental Monitoring Report drafted by consulting services in this project in October 2005, it was reported that the aquatic ecosystem of the lakes became stable after project implementation. Sludge inside the sewer line and sediment at the Yen So Pumping Station were appropriately disposed of at the Yen My site according to the Vietnamese environmental regulations. Similarly excavated soil was disposed of appropriately at the Van Phuc disposal site.

The dumping of illegal solid waste into the rivers decreased after the dredging and embankment work of the rivers including the construction of roads at river side. Particularly, the environment of the upper Kim Nguu River side was remarkably improved by this project. This is because road development restricts residents in discarding their waste.

According to the results of a beneficiary survey with 103 Hanoi residents, the following environmental impacts are widely perceived by the beneficiaries: “Decrease in bad odors” (73.8% of respondents), “Decrease in waste in the drainage system” (79.6% of respondents), and “Improvement of scenery” (75.7% of respondents). However, again, one third of the respondents in Phuong Liet and Thanh Liet (38.5% and 33.3%) stated that bad odors had increased in their area. This may be because these areas have some swamps where anti-septic reaction to wastewater causes odor.

Factors for the above impacts perceived by the Hanoi residents were considered to be: (i) more frequent waste water collection by HSDC, and more importantly, (ii) changes in people’s behavior. The construction of roads along the lakes and embankment along the river and canal sides have prevented people from dumping waste into the lakes, rivers and canals.

[20] MOSTE is reformed to the Ministry of Natural Resource and Environment (MONRE) and the Ministry of Science and Technology (MOST).

Photographs of Rivers and Drainage Channels in Hanoi at Selected Project Locations

Before project implementation

After project completion

However, the impact on the improvement of the water quality of rivers and lakes in Hanoi is far from adequate. Generally, lakes and rivers in Hanoi are polluted and do not meet the Vietnamese Normative Standards for the environment. The Kim Nguu River and the To Lich River are the most polluted, as shown in Table 7 below. The Department of Natural Resource and Environment (DONRE) of HPC is in charge of the environmental monitoring for the lakes and rivers in Hanoi. However, due to budget constraints, DONRE has not carried out the environmental monitoring activities properly. They usually conducted the ad-hoc environmental monitoring and the sampling spots were not selected at the same place for every time. Therefore, due to the difficulty in collecting the consistent water quality data for the lake and rivers in Hanoi during and after the project implementation, Table 7 presents only the water quality data for 2007 and 2008. The comparative analysis of water quality before and after the project was not available in this evaluation.

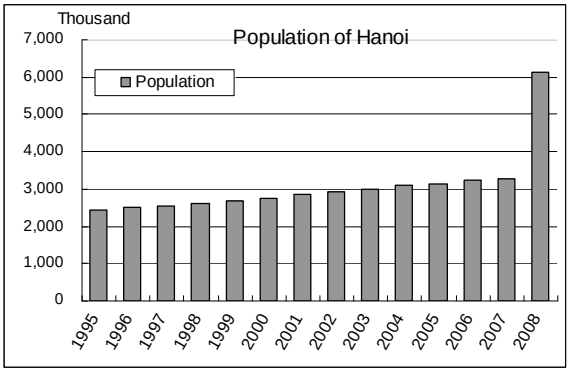
Table 7: Environmental Monitoring Data at Selected Lakes and Rivers in Hanoi

Lake and River	Para meter	Unit	2007		2008		VN Normative Standards 08-2008 (Column B)
			Dry season	Rainy season	Dry Season	Rainy season	
Hoan Kiem Lake	pH	-	7.9 - 9.5	9.0 - 9.5	6.6 - 7.5	8.3 - 8.7	5.5 - 9
	DO	mg/l	8.8 - 10.1	10.2 - 10.6	4.5 - 4.8	7.3 - 8.2	≥ 2
	BOD5	mg/l	38 - 41	31 - 38	25 – 28	18 - 28	15 - 25
	COD	mg/l	61 - 133	60 - 74	41 – 48	33 - 46	30 - 50
	TSS	mg/l	285 - 306	89 - 96	27 – 33	54 - 58	50 - 100
Bai Mau River	pH	-	7.4 - 7.8	7.6 - 7.8	6.9 - 7.2	8.6 - 8.8	5.5 - 9
	DO	mg/l	2.3 - 6.9	2.3 - 6.8	2.8 - 5.0	11.9 - 12.2	≥ 2
	BOD5	mg/l	13 - 18	19 - 28	9 – 14	25 - 29	15 - 25
	COD	mg/l	31 - 41	47 - 68	13 – 28	40 - 46	30 - 50
	TSS	mg/l	41 - 73	32 - 49	15 – 33	40 - 59	50 - 100

Lake and River	Para meter	Unit	2007		2008		VN Normative Standards 08-2008 (Column B)
			Dry season	Rainy season	Dry Season	Rainy season	
Kim Nguu River	pH	-	6.9 - 7.1	7.1 - 7.7	6.6 - 6.9	6.3 - 6.4	5.5 - 9
	DO	mg/l	0.1 - 0.2	2.8 - 4.1	0.8 - 1.9	0.07 - 0.16	≥ 2
	BOD5	mg/l	121 - 266	61 - 83	41 – 69	83 - 290	15 - 25
	COD	mg/l	269 - 422	123 - 145	60 – 150	197 - 308	30 - 50
	TSS	mg/l	115 - 299	83 - 119	45 – 81	129 - 180	50 - 100
Lu River	pH	-	7.1 - 7.4	6.9 - 7.8	6.7 - 7.2	6.5 - 6.8	5.5 - 9
	DO	mg/l	0.2 - 0.7	2.6 - 3.1	0.7 - 1.2	0.11 - 0.3	≥ 2
	BOD5	mg/l	101 - 156	33 - 59	67 – 133	32 - 64	15 - 25
	COD	mg/l	286 - 328	76 - 91	96 – 262	83 - 97	30 - 50
	TSS	mg/l	55 - 78	32 - 69	30 – 46	41 - 55	50 - 100
To Lich River	pH	-	7.1 - 7.4	6.0 - 7.6	6.5 - 7.1	6.5 - 7.1	5.5 - 9
	DO	mg/l	0.5 - 1.6	1.1 - 1.7	0.3 - 1.4	0.01 - 0.26	≥ 2
	BOD5	mg/l	128 - 284	61 - 187	95 – 188	46 - 130	15 - 25
	COD	mg/l	388 - 476	121 - 222	110 – 200	93 - 158	30 - 50
	TSS	mg/l	131 - 192	40 - 108	45 – 123	25 - 68	50 - 100

Source: Ministry of National Resources and Environmental Protection (MONRE).
Note: Vietnamese Normative Standards 08- 2008 (Column B - for the purpose of irrigation, waterway transport and other purposes with requirements for low water quality).

Contamination of DO, BOD, COD, and TSS[21] particularly increases in the dry season, when the water quality becomes seriously bad. The primary reason for the bad water quality of lakes and rivers in Hanoi is that since Hanoi city does not have a separate sewerage system and wastewater treatment plants except for the two pilot treatment plants and one plant in North Thang Long zone[22], all wastewater is discharged into the rivers and lakes. In Hanoi approximately 500,000 m^3 of wastewater, of which approximately 400,000 m^3 is domestic wastewater, is discharged everyday. Only 9-11 % of this is treated at the existing wastewater treatment plants. The situation has deteriorated with the rapid growth of population in Hanoi[23] as well as with the progress of urbanization and industrialization in the city (Figure 5). Furthermore, weak enforcement of environmental protection measures for industries has resulted in discharge of a large volume of untreated industrial wastewater, seriously affecting the water quality in rivers and lakes. Hanoi PC makes



Source: General Statistic Office (GSO).

Figure 5: Population of Hanoi

[21] DO: Dissolved Oxygen, BOD: Biochemical Oxygen Demand, COD: Chemical Oxygen Demand, and TSS: Total Suspended Solid.

[22] This wastewater treatment plant was constructed by Japanese ODA loan project "Hanoi Urban Infrastructure Development Project" and put into operation in 2008. The capacity of the plant is 40,000m^3/day.

[23] In August 2008, Hanoi expanded by merging with the neighboring districts and villages of Ha Tay, Vinh Phuc, Hoa Binh Provinces, and its area extended to 3,345 km2 which was 3.6 times larger than the existing area with a total population of about 6.23 million.

continuous efforts to develop the sewerage system, which is one of the biggest challenges in Hanoi.

In sum, this project has produced certain positive environmental impacts such as a decrease in bad odors, a decrease in waste in drains, open channels, and rivers, and improvement in the scenery in areas near the drainage facilities. Also there has been no major negative environmental impact during implementation. However, considering the objective and scope of this project, that is, the main purpose of this project is improving the existing drainage facility for flood control, it seems that the contribution to the improvement of water quality of rivers and lakes has been very limited. The fundamental improvement of the water quality of the rivers and lakes will not be achieved without measures such as the construction of large-scale of wastewater treatment facilities and development of a separate sewerage system in Hanoi.

3.4.2 Other Impacts

(1) Impact of Land Acquisition and Resettlement

The actual acquired land area was 470 ha and the actual number of resettled households was 327. This was less than in the plan. Among the resettled 327 households, 104 households were provided with a housing plot in the Dong Tau resettlement zone and 223 households were provided with flats in the Dam Trau area[24]. The construction of resettlement areas of 10.8ha, the provision of community roads, drainage systems and electricity and water supply services, but not the construction of houses, were components of this project (Table 8).

There was a difficulty in persuading and negotiating with the households affected to accept the compensation due to (i) difficulty in identifying the affected households due to the delay in finalizing the project boundary and detailed design, (ii) frequent change in the compensation rates and calculation methods according to the changes in HPC's policy and regulations on land acquisition and resettlement and (iii) insufficient operation of Site Clearance Council (SCC) including a lack of clear and detailed explanation provided to households. Hence, the actual implementation period for land acquisition and resettlement took more than two times longer than the planned period.

Table 8: Land Acquisition and Resettlement

Item	Plan	Actual
1. Acquired land area (ha)	504	470
2. No. of households compensated (No.)	n.a.	3,270
3. No. of households resettled (No.)	300*	327
4. Infrastructure at the Dong Tau resettlement area		
a) Area (ha)	10.3	10.8
b) Length of roads (m)	2,345.95	2,345.95
c) Length of drainage systems (m)	4,122.5	4,122.5
d) Number of electricity subscribers (No.)	104	104
e) Number of water supply subscribers (No.)	104	104

Source: Hanoi Sewerage Drainage-Project Management Board (HSD-PMB).

Note: Although the resettlement plan was prepared at the early stage of this project, it did not identify the number of resettled households. Therefore, information on the planned number of resettled households (300 households) was quoted from the JICA's appraisal document of I-2 (VNV-1).

[24] It is not necessarily the case that the 327 households originally resettled are still living in the Dong Tau resettlement area and the Dam Trau area as quite a few households sold their property rights to others and moved to other places.

The acquired land area decreased from 504 ha to 470ha. This is because work items including Linh Dam Lake and the construction of Linh Dam channel connecting Linh Dam Lake with the Yen So Pumping Station was excluded from this project,. As a result, this project required less land acquisition than was expected. On the other hand, the number of resettled households increased from 300 households to 327 households.

Photograph of Resettlement Area

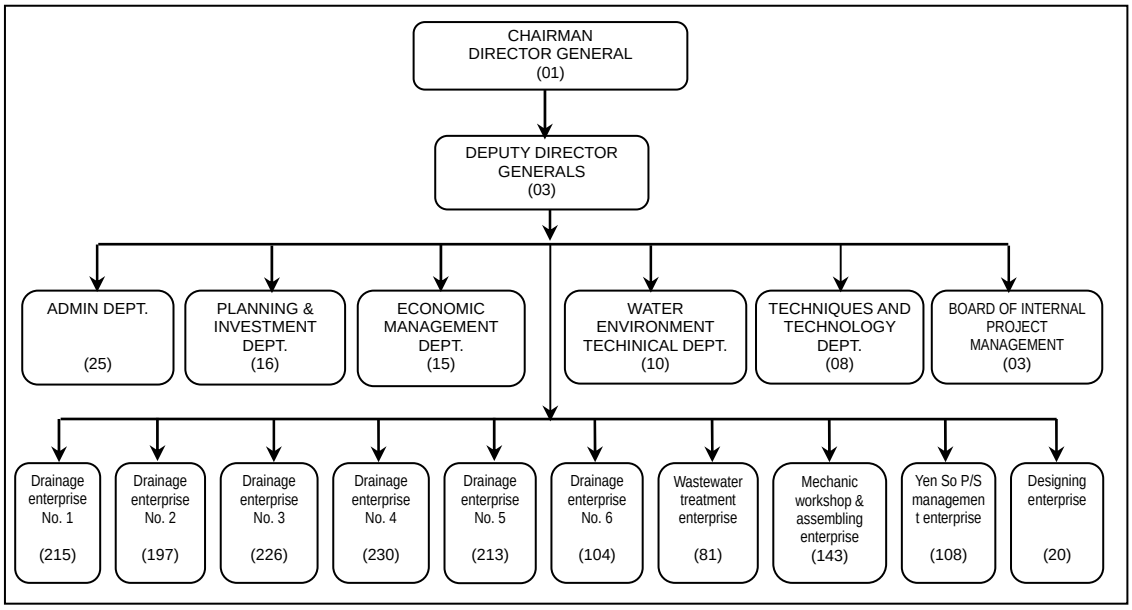
Dong Tau resettlement Area

According to the results of a Focus Group of 13 resettled households, all were satisfied with the resettlement (11 out of 13 households were very satisfied; 2 out of 13 were satisfied to some extent). Major changes perceived after the project by the 13 households interviewed were: (i) better scenery, (ii) inundation problems solved, (iii) improved traffic convenience, (iv) improved housing infrastructure and facilities, (v) better livelihoods, and (vi) improved environmental and hygiene conditions. No particular negative impacts on resettled households were observed.

3.5 Sustainability (Rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance agency for project facilities is the Hanoi Sewerage and Drainage Company (HSDC), which is a public corporation established in 1993. HSDC has 6 departments and 10 enterprises[25] and its total number of employees is 1,618 is as of January 2010. Figure 6 shows the organization chart of HSDC.



Source: Hanoi Sewerage and Drainage Company (HSDC).

Figure 6: Organization Chart of HSDC

[25] The enterprises of HSDC are part of the organizational units at department level and not independent companies.

In addition, roads and bridges constructed by this project are maintained by the Hanoi Transport Works Company No. 3 (Company No. 3) which is a public corporation established in 1965.

3.5.2 Technical Aspects of Operation and Maintenance

HSDC directly conducts small scale and periodic maintenance in accordance with the approved standards and guidelines established by the manufacturers as well as by the contractor and consultant of this project. However, large scale maintenance for those facilities such as pumping stations and wastewater treatment plants is usually conducted in cooperation with the manufacturers of the facilities due to the limited number of trained staff for electricity, mechanics and wastewater treatment engineering.

As mentioned earlier, a total 377 HSDC staff were trained during this project. At the same time, the ongoing second phase of this project includes a three-year O&M capacity development for 2007 to 2010 and many HSDC staff are continuously being trained by the project.

In addition, the Chiba Prefectural Government has supported the O&M capacity development of HSDC staff between 2007 and 2010 through the JICA Partnership Program. This includes the dispatch short-term of Japanese technical experts to HSDC as well as hands-on training of HSDC staff in Japan[26]. HSDC also cooperated with the Chiba Prefectural Government in Japan for capacity development of staff through short-term overseas training held in Japan.

3.5.3 Financial Aspects of Operation and Maintenance

The annual HSDC budget, including the O&M costs of the project facilities is provided by the HPC. As their activities, as well as their service territory, has expanded, the annual budget has increased year by year. In particular, after the expansion of Hanoi's administrative territory in August 2008, it was elevated to twice that of before (Table 9).

Table 9: Annual Budget of HSDC

Unit: million VND

	2007	2008	2009	2010
Annual budget	121,000	136,000	290,000	320,000

Source: Hanoi Sewerage and Drainage Company (HSDC).

In 2007, the Government announced Decree 88/2007/ND-CP on wastewater fees payment whereby all organizations and households discharging wastewater into the drainage and sewerage system must pay at least 10% of water supply fees as wastewater fees. The purpose of this Decree was to recover 100% of the O&M costs for the drainage and sewerage systems through wastewater fees payment. However, this regulation has not yet been implemented in Hanoi city[27]. At present, the O&M cost of the drainage and sewerage systems in Hanoi is allocated from the collection of the existing environmental protection fees from water users[28]. However, only approximately 30% of the total O&M cost is recovered. The environmental

[26] Strengthening Capacity in Operation and Management Works at Sewerage Treatment Facilities and Water Environment Enlightenment in Hanoi (April 2007-Mar 2010). In this program, three Japanese technical experts from the Chiba Prefectural Government were dispatched to HSDC in July 2007, March and July 2008 while at the same time three members of HSDC staff were invited to undertake technical training at a waste water treatment plant in the Chiba Prefecture in November 2007 and 2008.

[27] The second phase of this project includes a study on the wastewater tariff system in Hanoi as a part of the consulting service component. The results of this study are to be utilized for the establishment of a new wastewater tariff system in Hanoi in line with Decree 88/2007/ND-CP.

[28] Stipulated in Government Degree No.67/2003/ND-CP dated June 13, 2003, and Decree 04/2007/ ND-CP dated January 8, 2007.

protection fees collected are not directly returned to HSDC, and the O&M budget comes form the HPC. According to HSDC's self-evaluation, the amount of allocated O&M budget is generally adequate.

3.5.4 Current Status of Operation and Maintenance

After 10 years operation for the Yen So Pumping Station, in 2009, HSDC conducted maintenance work replacing ball bearings, seals, etc. for 5 ordinary pumps in order to fix problems in the electric control box. All equipment in the drainage segment has been repaired. All spare parts procured by this project have been used for repairs and maintenance. Most of the spare parts for the Kim Lien and Truc Bach wastewater treatment plants were used to replace broken parts such as belts, ball bearings, seals, etc. Thanks to proper and timely maintenance activities, the majority of project facilities are in general maintained in good condition.

Photograph of O&M Work

Maintenance of drain by HSDC staff

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

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

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

4.2 Recommendations

4.2.1 Recommendations for the related agencies

(1) Recommendation to Hanoi People's Committee (HPC)

Since this project was the first large-scale infrastructure development project covering a number of districts of Hanoi city and involving the many central and local government agencies, this project had a problem in coordination among the stakeholders. For example, there was a weak coordination and information sharing between this project and other on-going projects and there was a duplication of some project components and locations between this project and other on-going projects. This problem was mostly caused by the inappropriate project management system and capacity of HPC. The SAPI study pointed out some factors in the inappropriate project management of HPC such as the inappropriate understanding of the role and responsibilities of HPC as an executing agency of the project, the limited power and functions of PMB in project implementation, and the lack of human resources. Therefore, HPC did not play a proactive role in overall project management and coordination.

In order to improve such problems in the second phase of this project, HPC must pay attention to defining the coordination mechanism, roles and responsibility, and the decision-making flow among the stakeholders prior to project implementation.

(2) Recommendation to Hanoi People's Committee (HPC), Project Management Board (PMB) and Site Clearance Council (SCC)

Delay in land acquisition was identified as one of the five main causes that prolonged project implementation and incurred additional costs, as analyzed in Section 3.2.2.1. In the land acquisition process, there was a difficulty in persuading and negotiating with the affected households for acceptance of compensation due to (i) difficulty in identifying the households

affected due to the delay in finalizing the project boundary and detailed design, (ii) frequent changes in the compensation rates and calculation methods according to changes in HPC policy and regulations on the land acquisition and resettlement and (iii) insufficient operation of the Site Clearance Council (SCC) including a lack of provision of clear and detailed explanations to households.

Particularly the issues (i) and (iii) were related to the lack of information sharing among the relevant stakeholders especially the project, the local authorities and the people.

In order to improve such problems in the second phase of this project, HPC as well as PMB and SCC should improve information sharing among the project, the local authorities and the people by strengthening public relations. For example, provision of information to the local authorities and the people on the objectives, importance, and achievements of the project as well as information on land acquisition and resettlement through the mass media and community meetings may help to promote their consensus and support for the project, thus ensuring the progress of the project.

4.2.2 Recommendation for JICA

Not specifically.

4.3 Lessons Learned

(1) Lessons learned for information sharing and public relations regarding the land acquisition

In order to facilitate the land acquisition process, the executing agency of the project as well as the local authorities in charge of land acquisition should promote information sharing and public relations through the mass media and community meetings to the project affected people including the provision of information on the objectives of the project, social benefits of the project as well as information on land acquisition and compensation policy, etc. In order to do so, the close coordination, information sharing, and a sense of common responsibility between the executing agency of the project and the local authority are indispensable. These measures may promote the understanding and cooperation of the affected people towards the project

Comparison of the Original and Actual Scope of the Project

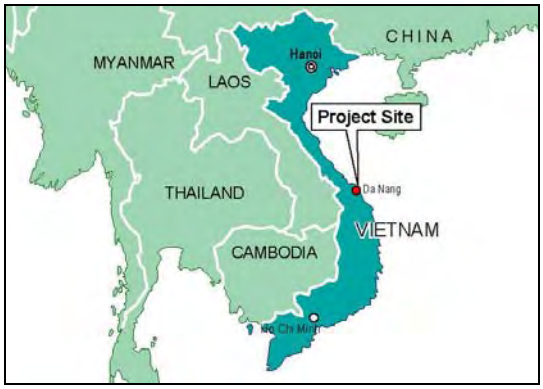
Item	Plan	Actual
1. Project Outputs 1) Construction of Yen So Pumping Station cluster	• Construction of Yen So Pumping Station: capacity of 45m^3/s • Construction of regulating reservoirs: storage capacity of 4.9 mil. m^3 • Spillways: 3 • Inlet channel: 1.2km • Outlet channel: 1.6km • Yen So channel: 3.4km • 8 bridges and 6 culverts	• Same as planned except the number of culvert was reduced from 6 to 5.
2) River improvement	• Dredging and embanking of To Lich River, Lu River, Set River, Lu-Set floodway, Upper and Lower Kim Nguu River (33.8km) • Construction of 29 bridges and culverts	• Dredging and embankment was completed almost as planned (31.1km) • Construction of 7 bridges and culverts • Additional: 6km road construction along the To Lich River
3) Construction of flood and control gates	• 7 locations	• Same as planned
4) Lake improvement	• Dredging of 4 lakes (Giang Vo, Thanh Nhan 1, Thanh Nhan 2a, Thanh Nhan 2b) • Aeration applied in Thanh Cong Lake and Thien Quang Lake	• Same as planned • Dredging of Thanh Cong Lake and Thien Quang Lake was implemented instead of aeration
5) Drainage channel improvement	• Construction of bridges and culverts at 54 locations	• Same as planned
6) Construction and rehabilitation of Sewers	• West Lake basin, To Lich basin, Set River basin, Upper Lu River basin, and Kim Nguu River basin	• Same as planned
7) Construction of pilot waste water treatment plants at Kim Lien and Truc Bach	• Capacity of Kim Lien WWT plant: 3,700m^3/day • Capacity o Truc Bach WWT plant 2,300m^3/day • Activated sludge method applied	• Same as planned.
8) Procurement of dredging equipment and facilities	• 1 batch/package of 63 equipments units	• 1 batch as planned, and 1 additional package (total 88 equipment units)
9) Development of resettlement area	• 10.3 ha at Dong Tau resettlement zone	• 10.8 ha
10) Training	• No. of staff trained • O&M of Yen So Pumping Station: 34 • O&M for drainage systems: 288 • O&M for WWT plants: 55	• Same as planned
11) Consultant services	• International consultant: 368 M/M • National consultant: 1,092 M/M	• International consultant: 507.8 M/M • National consultant: 1,651.9 M/M
2. Project Period	April 1995 – April 2000 (61 months)	April 1995 – August 2005 (125 months)
3. Project Cost Amount paid in Foreign currency	15,160 million yen	14,422 million yen
Amount paid in Local currency	7,727 million yen (772,658 million VND)	7,080 million yen (885,000 million VND)
Total	22,887 million yen	21,502 million yen
Japanese ODA loan portion	18,571 million yen	15,288 million yen
Exchange rate	1 VND = 0.010 yen (As of October 1997) Note: Based on the cost estimation of Phase I-2 (VNV-1)	1 VND = 0.008 yen (Average in 1995-2005)

Vietnam

Ex-Post Evaluation of Japanese ODA Loan Project
"Da Nang Port Improvement Project"

Evaluator: Vietnam-Japan Joint Evaluation Team 2009

1. Project Description



Project Site

Tien Sa Terminal

1.1 Background

Vietnam has a long coastline, totaling 3,260 km, as well as approximately 14,000 km of navigable rivers and canals, along which numerous ports exist. With the rapid economic development under the doi moi policy, cargo transportation by water has increased since the 1990s.

The Tien Sa Terminal (hereafter "Tien Sa Port") of Da Nang Port[1], located in Da Nang in Central Vietnam, is the third largest international sea port in the country (in terms of cargo handling volume) after Sai Gon Port in the South and Hai Phong Port in the North. Tien Sa Port is the center of maritime transportation in the Central region, and is also positioned as the eastern gateway of the 1,450 km East-West Economic Corridor passing through Vietnam, Laos, Thailand and Myanmar[2].

However, Tien Sa Port shared similar problems with other ports in Vietnam. These included aging facilities which had not been adjusted to meet the trends in the growing size of vessels and containerization. Also, as there was no breakwater, there was a high number of days when ship anchorage was impossible (30-60 days a year in 1995-1997) which hindered efficient cargo handling. Inconvenient road access to National Highway No. 1, a main arterial highway connecting the North and South regions, was another problem.

1.2 Project Outline

To enhance transportation in Central Vietnam through the improvement of Da Nang (Tien Sa) Port, located in Da Nang City in Central Vietnam, together with related port access, thereby contributing to the socio-economic development of the region.

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[1] Da Nang Port includes Tien Sa Terminal (sea port), Song Han Terminal (river port) and several other terminals used solely by particular companies.

[2] A component of the Expansion Maekong Regional Development Plan. Based on a Feasibility Study conducted by ADB, several Japanese ODA loan projects are involved: the Da Nang Port Improvement Project, the Hai Van Tunnel Construction Project and the 2nd Maekong International Bridge Project (Laos and Thailand).

Logical Framework Applied for Ex-Post Evaluation

Goal	Socio-economic development in Central Vietnam
Purpose	To enhance transportation in Central Vietnam through Tien Sa Port
Outcome	1) Increase in cargo throughout Tien Sa Port 2) Improvement of utilization of port capacity 3) Improvement of receiving capacity of Tien Sa Port 4) Improvement of access to Tien Sa Port
Outputs (planned at appraisal)	1) Improvement of Tien Sa Port: Construction of breakwater, repair of Piers 1 & 2, construction of container terminal, dredging, purchase of cargo-handling equipment 2) Improvement of access roads Construction of access roads, construction of Tuyen Song Bridge, improvement of Hoa Cam Junction 3) Construction of resettlement sites 4) Consulting services
Input (Planned at appraisal)	Total project cost: 13,637 million yen out of which, Japanese ODA loan: 10,690 million yen GOV contribution: 2,947 million yen

Approved Amount / Disbursed Amount	10,690 million yen / 9,210 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March, 1999 / March, 1999
Terms and Conditions	Interest Rate: 0.75% p.a.* or 1.8% p.a. Repayment Period: 40 years* or 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied
Borrower / Executing Agencies	The Government of the Socialist Republic of Vietnam / Project Management Unit No. 85 (PMU85), Ministry of Transport
Final Disbursement Date	January 23, 2007
Main Contractor (Over 1 billion yen)	Civil Engineering Construction Corporation No.1 (CIENCO 1) (Vietnam) - Civil Engineering Construction Corp. No.5 (CIENCO 5) (Vietnam) (JV) / Civil Engineering Construction Corporation No.6 (CIENCO 6)(Vietnam) / Rinkai Construction (Japan) - Vietnam Waterway Construction Corporation (Vietnam) (JV)
Main Consultant (Over 100 million yen)	Maunsell Group (Australia) - Japan Port Consultants, Ltd. (Japan) - Transport Engineering Design Corporation (Vietnam) (JV)
Feasibility Studies, etc.	”East-West Transportation Corridor Project, Tien Sa Port Design, Danang” Manusell Pty Ltd., ADB, 1997 “The Feasibility Study on Tien Sa and Access Road Improvement- Expansion Project” Transport Engineering Design Inc., 1998
Related Projects	Hai Van Pass Tunnel Construction Project (Japanese ODA Loan; Loan Agreement signed on March 1997)

Note: *1) For Consulting Services

2. Outline of the Evaluation Study

2.1 Evaluators

The Vietnam-Japan Joint Evaluation Team 2009 consisted of three Working Groups, each of which evaluated different projects. This project was evaluated by the Da Nang Port Group joined by the following members:

Ms. Phan Thị Liên, PMU 85
Mr. Nguyễn Đại Dũng, Vietnam National Shipping Lines
Mr. Nguyễn Xuân Dũng, Da Nang Port Company
Mr. Hồ Ninh, Da Nang Port Company
Mr. Phạm Đăng Hòa Bình, Da Nang Port Company
Mr. Trịnh Đức Trọng, Ministry of Planning and Investment
Mr. Nguyễn Ngọc Hải, Ministry of Transport (Evaluation Advisor)
Mr. Trần Lê Trà, PeaPROs Consulting JSC (Vietnamese Evaluation Consultant)
Mr. Mai Thế Cường, National Economic University (Vietnamese Evaluation Coordinator)
Ms. Takako Haraguchi, International Development Associates (Japanese External Evaluator)

2.2 Duration of Evaluation Study

For the ex-post evaluation, the study was conducted as per the following schedule.

Study Period: September 2009 – June 2010
On-Site Survey: November 30 – December 4, 2009 and January 16 – 27, 2010

2.3 Constraints during the Evaluation Study

As this was a joint evaluation with the dual purposes of (i) fulfilling the evaluation task of JICA and (ii) developing the evaluation capacity of personnel concerned in Vietnam through actual involvement in evaluation activities, a large part of the study period was spent in training for evaluation team members and in discussions within the team. At the same time, data/ information for evaluation in some aspect, including comprehensive and detailed data on operation of Da Nang Port (related to the evaluation of Effectiveness and Sustainability), were not provided on time. Therefore, the evaluation team could not complete some analyses such as recalculation of internal rates of return.

3. Results of Evaluation (Overall Rating: A)

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Vietnam

The evaluation team examined major policy/ planning documents from the project appraisal stage and the ex-post evaluation stage, such as the Socio-Economic Development Plan (SEDP) of Vietnam, the SEDP of Da Nang City, the National Transportation Master Plans[3], and Master Plans on Port Development. All of these documents mention the development of the Central region as a key priority, and the development of Tien Sa Port as one of the important measures for this.

This project is to implement Phase 1 of the three-phased Master Plan for Da Nang Port improvement and development prepared with JICA technical assistance in 1998 (see Box 1). This Master Plan is fully based on the National Port Development Master Plan (1996) and the ADB feasibility study on East West Economic Corridor development (1997).

[3] The Transportation Master Plan after 2001 refers to *The Study on the National Transport Development Strategy in the Socialist Republic of Vietnam (VITRANSS) 1* (2001) and *VITRANSS 2* (2010) prepared with JICA technical assistance.

Box 1: Da Nang Port Development Master Plan

Phase I:	rehabilitation of existing ports to handle 2.2 million ton/year of cargo (target year: 2004). This project is to implement the Phase I plan.
Phase II:	expansion of existing ports to handle 3.6 million ton/year of cargo (target year: 2009)
Phase III:	construction of Lien Chieu Port on the opposite shore of Da Nang Bay to handle 4.5 million ton/year or more (target year: 2012)

Source: JICA, 1998, OECF Special Assistance for Project Formulation for Da Nang Port Expansion Project

3.1.2 Relevance with the Development Needs of Vietnam

A need for an increase in cargo handling capacity at Tien Sa Port was observed. At the appraisal stage of this project, it was projected that cargo passing through the country would increase from 14.4 million tons in 1996 to 131 million tons in 2010. In fact, this number reached 181 million tons in 2007, with an average annual increase rate of 12% in 2003-2007.

In Tien Sa Port also, cargo volume was projected to increase from 0.9 million tons in 1996 to 10 million tons in 2010. However, the capacity of the Port in 1998 was 1.1 million tons with the existing piers (Pier 1 and Pier 2 with total 4 berths), or 1.7 million tons after completion of the fifth berth constructed by the Vietnamese Government [4]. As mentioned in *1.1 Background*, the aged and poor infrastructure and facilities of the Port hindered efficient cargo handling in terms of both bulk and containers.

Furthermore, there was a need for comprehensive development of the transportation infrastructure, including both city traffic and medium and long distance transportation (via the north-south axis of National Highway No.1 as well as through the East West Economic Corridor) as industrial and tourism development was promoted in Da Nang and neighboring areas.

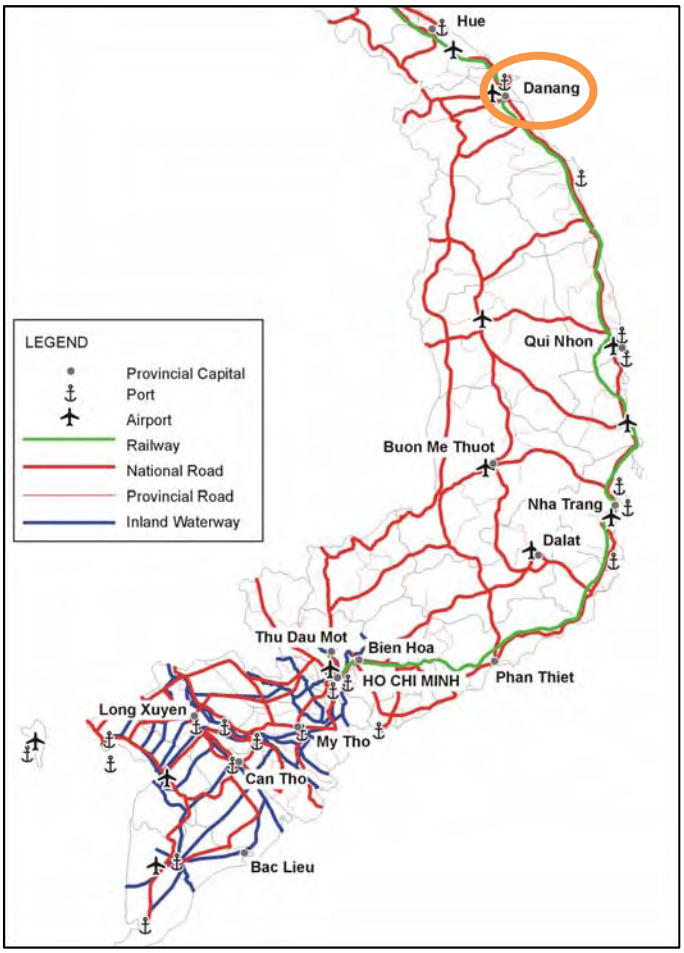


Figure 1: Major ports in the transportation system of central to southern Vietnam

[4] Berth 5 was constructed by the Ministry of Transport in 1997, and extended by Da Nang Port (operation and maintenance agency) in 2001.

3.1.3 Relevance with Japan's ODA Policy

In the Japanese country assistance policy for Vietnam (1994), the development of infrastructure was one of the five priority areas. As of FY1998, 30% of the total Japanese ODA loans since 1993 had been designated to the transportation sector.

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

The outputs originally planned, namely, the improvement of Tien Sa Port, the improvement of port access roads, the construction of resettlement areas and consulting services, were completed mostly as planned. These were implemented in six packages (Table 1 and Figure 2).

Figure 2: Project location

Table 1: Key outputs of the project

KEY OUTPUTS	PLANNED	ACTUAL	REMARKS
Package 1 Construction at Tien Sa Port	Breakwater: Length = 250m	**Breakwater: Length = 471.9m**	Breakwater length extended to better accommodate vessels
	Repair of Pier 1 & 2	Pier 1 & 2 repaired	Same as planned
	Container terminal: 45,414m^2	Container terminal: 92,000m^2	Adjusted
	Office Building: • *Administration office,* • *Amenity house,* • *Container freight station (CFS),* • *Maintenance shop,* • *Equipment yard,* • *Gate*	Office Building • *Administration office: 4 floors, total floor area: 2100m^2* • *Amenity house: 2 floors, constructed area 900m^2* • *Maintenance shop: Constructed area 1230m^2* • *Container freight station: Constructed area 767m^2 and 2 weighbridges with loading capacity of 65 ton* • *Gate and fence system 1.043m*	Same as planned
Package 2 Dredging	For Pier 1 and Pier 2 Depth: CDL -10m;	For Pier 1 and Pier 2 Depth: -10m	Same as planned
	Dredging volume: 55,400m^3	**Dredging volume: 222,565m^3**	Additional volume for better access for large ships
Package 3 Procurement of equipment	Cranes, tractors, Chassis, forklift, maintenance equipment, tugboat, computer system	Smaller quantity of equipment was procured	Adjusted to make use of existing equipment
Package 4 Port access	Improvement of access road (Ngo Quyen Street): 4 lanes, 12km	Access road improved (Ngo Quyen street): 4 lanes, 12.3km	Slightly adjusted
	Improvement of Hoa Cam T-junction	**Hoa Cam flyover constructed (L=248.19m)**	Design modified to alleviate traffic congestion
		Ngo Quyen bypass constructed (L=2,865m)	Added for better future traffic flow
		Da Nang bypass constructed (L=18,283.12m)	Added for better future traffic flow
Package 5 Tuyen Son Bridge	4 lanes, 520m; Approach road	L bridge = 519.1m Approach road L = 1,478.2m	Slightly adjusted
Package 6 Resettlement	Affected households: 83	Affected households: 5,445 (of which 1,632 affected by the construction of Da Nang bypass)	Increased due to additional road construction
	Construction area: 238,846m^2	Construction area: 239,638m^2	Slightly adjusted

Source: PMU 85

All of the packages were adjusted to meet the practical conditions and requirements of local development policies at the time of implementation. As a result, the actual workload and sizes of the packages, with exception of package 3, were larger than planned. It has been noted that a balanced budget was used to cover the expenses of additional work caused by the adjustments. The total investment, therefore, remains within the originally approved budget. However, the duration of the implementation increased remarkably.

(1) Improvement of Tien Sa Port

Key outputs of Package 1 include the construction of a breakwater, a container terminal, an office building and the repair of two piers (Figure 3). A number of other outputs, namely the container gate, maintenance workshop, container freight station and brick fence around the port area, were also constructed and equipped in order to enhance the smooth operation of the port.

Figure 3: Key construction at Tien Sa Port

Breakwater. One of the most important adjustments in Package 1 was that of the breakwater, which was originally designed with a length of 250m. By September 2003, a 271.9m breakwater had been constructed. From June 2005 to April 2007, an almost additional 200m was constructed, increasing the total length of the breakwater to 471.9m. The adjustment is assessed to be positive in that it ensures a higher rate of use of the piers in unfavorable weather conditions.

Container terminal. The container terminal was also constructed in two stages. The first took place from January 2002 to December 2003, when a container yard of 47,023m^2 was constructed. The extension of the container yard, which started in mid January 2004 and was completed in September of the same year, increased the total area of the container yard to nearly 92,000 m^2.[5]

[5] The total area available for container yards in Tien Sa Port was approximately 92,000m^2, out of which the project originally planned to develop 45,414m^2 and actually developed 47,023m^2 in the first stage. However, as the ground level of this area became more than 1 m higher than the other area, elevation of the remaining 44,977m^2 and other related works were added in the second stage to reduce such a big difference in level. There is still a 5cm gap between the ground level of the first stage and second stage areas (i.e., the second stage area is 5cm lower) for the elevation of the remaining 5cm in the second stage area will be done after the planned construction of crane foundations in future..

Dredging. The dredging work took place for Pier 1 and Pier 2 (Berths 1-4)[6] at a depth of 10m as designed. However, the dredging volume increased remarkably from 55,400 m^3 to 222,565m^3 to dredge a wider navigation area to provide better access for large ships.

Table 2: Types and quantity of equipment procured

ITEMS	PLANNED	ACTUAL
Quayside container crane	1 unit	1 unit
Transfer crane	2 units	2 units
Yard Tractor	8 units	4 units
Yard chassis	12 units	6 units
Forklift	3 units	3 units
Maintenance equipment		0 unit
Tugboat	1 unit	0 unit
Computer system		1 unit
Emergency Generator	Not planned	1 unit

Source: PMU 85

Procurement of equipment. Based on the actual conditions of Tien Sa Port and the existing equipment available at the Port, the Vietnam National Shipping Lines (VINALINES) requested PMU 85 that the quantity of some equipment intended for Da Nang Port be reduced **(**Table 2**)**. However, since the electric system at the port area was not stable at the time of project implementation, at risk was the safe and effective operation of other equipment such as the quayside container crane and the lighting system at container terminal. Thus, additional investment in an emergency generator by using residual budget was proposed by the port and approved by MOT.

(2) Improvement of port access

The package for port access originally included the improvement of an access road (Ngo Quyen street on National Highway No. 14B) and Hoa Cam junction.

Ngo Quyen street before and after the project

The design of Hoa Cam junction was, however, modified from a T-junction to a flyover to ensure traffic safety and to accommodate a larger traffic volume, which was expected to increase sharply when the East West Economic Corridor is completed and more vehicles, including heavy trucks, travel in and out Tien Sa Port during rush hours.

Hoa Cam flyover

[6] Berth 5 (-12m) was dredged by Da Nang Port.

(3) Additional outputs using the balanced budget
Ngo Quyen bypass and Da Nang bypass (South Hai Van - Tuy Loan bypass) are two important additional outputs using the residual budget of the project.

Ngo Quyen bypass. This bypass was built to ensure a smooth flow of traffic during the construction of Ngo Quyen access road. It was also expected that this would help in speeding up the progress of Ngo Quyen bypass construction by reducing traffic volume through the construction site. The bypass is still in use and provides an exit for small vehicles in the case of traffic jams.

Da Nang bypass. This bypass has a total length of 18,283.12m, beginning at Hai Van pass tunnel (constructed by another Japanese ODA loan project) and ending at the junction with National Highway No. 14B at Tuy Loan. This section connects Hai Van tunnel with 1) Hoa Cam junction – Tuyen Son bridge – Ngo Quyen street and Tien Sa Port; and 2) the national highway and the East West Economic Corridor. The construction of the Da Nang bypass was highly appreciated by the local authorities of Da Nang City (the City People's Committee and the Department of Transport) because of its contribution to the comprehensive traffic system of Da Nang City, to the central region of Vietnam in general and to the development of Tien Sa Port in particular.

(4) Construction of resettlement areas
The number of households that needed to be resettled due to the implementation of the project increased remarkably from 83 (estimated at the appraisal) to 5,445 mainly due to the construction of the additional outputs of the Ngo Quyen access road, the Ngo Quyen bypass and the Da Nang bypass.

Table 3: Key construction and facilities in resettlement areas[7]

Resettlement area		**Facilities**
Total	**239,638m^2**	
Public area	23,336m^2	Drainage system
Building area	120,622m^2	Water supply system
Planting area	5,618m^2	Electricity supply system
Traffic area	88,705m^2	Outside Lighting system

Source: PMU 85

The project developed resettlement areas in the peri-urban communes of Man Thai and An Hai Bac for 3,813 households which were affected by the Ngo Quyen access road, the Ngo Quyen bypass and Tuyen Son bridge[8]. The total area of the resettlement site and associated civil construction and utilities handled by this project was therefore adjusted accordingly (Table 4).

(5) Consulting services
Consulting services were provided in the following areas as planned: surveys and studies, detailed design, preparation of tender documents, assistance in tendering, construction supervision, training and works related to environmental considerations (advice and training). The volume of work volume increased due to additional scope and to delays

3.2.2 Project Inputs

3.2.2.1 Project Period (sub-rating: b)

It was planned that the project would be implemented within a period of 56 months, from the Loan Agreement signing date on March 30th, 1999 to the end of October 2003. Completion was defined as the completion of construction works and equipment procurement.

[7] The resettlement area constructed with funds from the local authority (Da Nang City) is not included.

[8] The local government used their own funds to relocate the remaining 1,682 households. Consequently, all of the 5,445 affected households were relocated.

The actual completion date of the project in terms of the original scope was December 2005, with a total period of 81 months. The project was therefore 25 months or 144% longer than the plan (Table 4).

Table 4: Summary of project period by contract package

Package	Planned*		Actual		Remarks
	Start	*Completed*	*Start*	*Completed*	
Overall	**Mar 1999**	**Oct 2003**	**Mar 1999**	**Dec 2005**	**Delayed**
	56 months		81 months		144%
Package 1	11/2001	9/2003	11/2001	12/2003	3 months delayed
2	3/2003	9/2003	3/2003	3/2005	18 months delayed
3	2/2004	2/2005	2/2004	12/2005	10 months delayed
4	3/2002	3/2004	3/2002	11/2004**	8 months delayed
5	2/2002	3/2004	2/2002	2/2004***	1 month earlier
6	3/2002	9/2002	9/2002	6/2004	20 months delayed

Source: PMU 85

*Note: * "Planned" for each package is the plan in the original contract.*
*** Except the car park; *** The opening date of the bridge*

The implementation of additional outputs was completed in April 2008.

Several reasons have been listed to explain the delays in the implementation of the project. The most notable ones include:

- **Adjustments and modifications of the technical specifications and/or design**: A number of adjustments and modifications were made during the implementation of the project to meet practical conditions and the development objectives of the local government. The most important examples include the change of the Hoa Cam junction design from a T-junction to a flyover and the construction of the Ngo Quyen bypass. The modifications were made to accommodate the trend of increasing traffic volume in the area.

- **Administrative complications**: The administrative procedure is reported to have been complicated and time consuming. It took a long time for modifications and adjustment to the original plan to receive approval from officers in different levels within the authorized bodies, of which the highest was MOT.

- **Slow progress of land acquisition and resettlement**: Land acquisition and resettlement have always been a challenge in all construction projects in Vietnam, especially when they take place in urban areas, where a large number of households exist and where the market price of land is always remarkably higher than the level of compensation approved by the government. For this project, too, the land acquisition and resettlement process was delayed even though it was considered as one of the most successful cases (see also *3.4.2 (3) Impact of Land Acquisition and Resettlement*). Due to the modification of and additional construction on the Ngo Quyen access road and the Ngo Quyen bypass, which are located in an urban area of Da Nang City, the number of resettled households was remarkably higher than expected. Prompt enough action was not taken to assign appropriate areas for resettlement. In addition, some households resisted the resettlement plan due to disagreement on the level of compensation. As a result, the progress of land acquisition was slow and the local government delayed handing over the resettlement sites to the project management unit for construction.

- **Capacity of the contractors**: Like in many other large-scale development projects, this project required a high level of technical and financial capacity and experience of contractors. Therefore, it was large construction contractors who won the tender for most packages. These contractors, however, were involved in many assignments at the same time and therefore failed to allocate sufficient resources (human resources, financial resources and equipment) to the Da Nang Port project. In addition, according to PMU 85, in many bidding cases, contractors seek for winning a bid rather than proposing a feasible price and thus they ended up overloading their staff with work or assigning personnel whose capabilities were insufficient[9].

- **Management capacity of the PMU**: Similar to that of the construction contractors, the management capacity of PMU 85 was considered sufficient at the time of appraisal. However, the involvement of the PMU in other existing or newly added assignments somehow put pressure upon its capacity of managing the Da Nang Port project. Limitations in the management capacity of the PMU were also found in its experience in organizing international bidding, which is complicated and time-consuming, and also in selecting contractors with sufficient capacity.

- **Other**: Bad weather and traffic on the road during road construction were also reported as important reasons for delays. The construction of the breakwater, for example, took place under regular heavy rains, strong winds and storms. In the case of Tuyen Son bridge, the Ngo Quyen bypass and the Hoa Cam flyover, the contractors were not able to fully mobilize human resources and machinery for the construction due to heavy traffic during the day time.

3.2.2.2 Project Cost (rating: a - lower than planned)

According to the Loan Agreement, the total project cost was JPY 13,637 million, in which the Japanese ODA loan portion was JPY 10,690 million and the Government of Vietnam portion was JPY 2,947 million.

Table 5: Comparison of Planned and Actual Project Cost

Unit: 1,000,000 JPY

No	Item cost	Plan	Actual	Balance
1	**Japanese ODA loan**	**10,690**	**9,210**	**1,480**
	Construction works	*8,293*	*7,173*	*1,120*
	Procurement of Equipment	*981*	*894*	*87*
	Consulting services	*970*	*870*	*100*
	Interest	*435*	*273*	*162*
	Contingency	*11*		*11*
2	**GoV contribution**	**2,947**	**1,068**	**1,879**
	Total	**13,637**	**10,278**	**3,359**

Source: PMU 85

The actual total project cost was JPY 10,278 million (75.37% of the original planned budget), of which the Japanese ODA loan was JPY 9,210 million (Table 5). The cost savings of the project, of which the largest part comes from construction work, were reported to be mainly as a result of competitive bidding On the one hand, such savings provided favorable conditions for the construction of additional outputs, which enhanced the effectiveness and impacts of the project. However, on the other hand, the unreasonably low bidding price was reported to be one of the

[9] At present, such cases have decreased and bidders propose higher prices.

causes for delays in project implementation, because the contractors did not have the adequate capacity to deliver their committed outputs (see also *3.2.2.1 Project Period*).

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

3.3 Effectiveness (Rating: a)

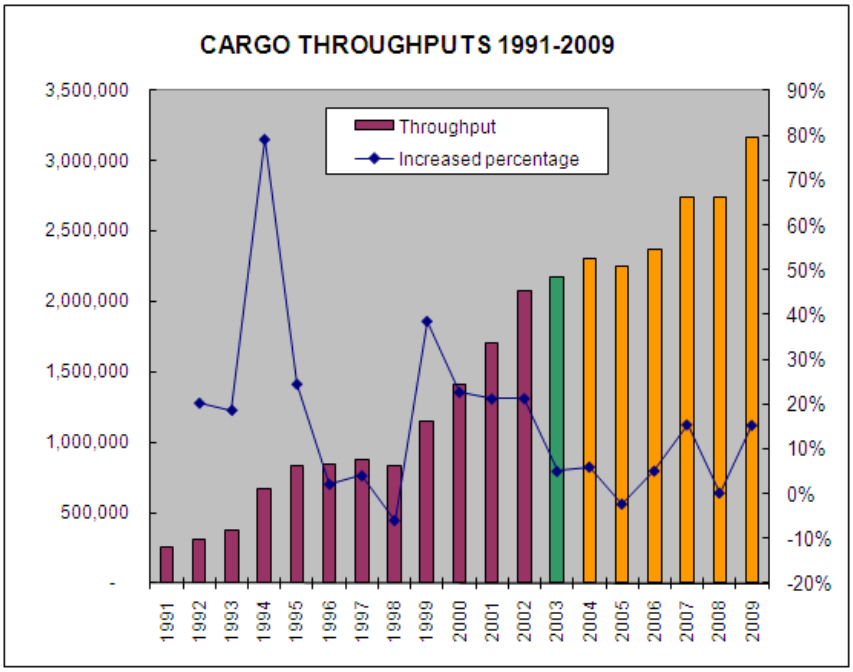
3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

(1) Increase of annual cargo volume of Da Nang Port[10]

Total increase of volume: higher than expected. Before the project, cargo traveling through Da Nang Port was recorded at 882,218 tons in 1997 and 829,521 tons in 1999.

At the stage of appraisal, a JICA study (1998) predicted that this level would reach 2.8 million tons (low scenario) to 3.1 million tons (medium scenario) in 2009. In reality, the level at Da Nang Port was recorded at 3,162,315 tons in 2009, slightly higher than expected and 4 times higher than the total for 1998 – the year before the implementation of this project. The annual average increase rate between 1997 and 2009 was 11.2%.



Source: Da Nang Port (2010)

Figure 4: Cargo traffic for Da Nang Port from 1991 to 2009

Increase of container traffic through the port by TEU According to the records of Da Nang Port, container traffic through the port increased from 13,484 TEUs (twenty-foot equivalent units to count the number of containers) in 1998 to 69,720 TEUs in 2009. Although this trend is positive, the level is still lower than the projection at the stage of project appraisal (164,000

[10] In this section, numbers shown for Da Nang Port possibly include those for Song Han Port. According to the website of Da Nang Port, the annual volume at Tien Sa Port is reported to be more than 4.5 million tons, while for Song Han Port the number is more than 1 million tons. From this, it can be estimated that at the number for Tien Sa Port accounts for 82% of the total for Da Nang Port (excluding figures for smaller terminals specialized in specific enterprises).

TEUs in 2010[11]). According to the results of interviews with port users and port managers (Table 8), possible reasons may include: (i) Too high an expectation of the possible impact of the East-West Economic Corridor; and (ii) Clients still preferring to use the "traditional" destinations of Sai Gon Port or Hai Phong Port.

(2) Increase in ship calls

Number of ships going through Da Nang Port. The years after project completion witnessed increases in the number of ships, including container, cruise and general cargo ships, going through Da Nang Port (Table 6). The number of passengers increased accordingly and was recorded at 30,677 in 2009, the highest in the last 10 years.

Size of ships visiting. According to a JICA study (1998), the maximum dead weight tonnage of ships actually visiting Da Nang Port in 1997 was 4,695 DWT for container ships, 19,094 DWT for general cargo ships, 12,913 DWT for bulk carriers and 31,016 DWT for tankers (gas, oil). In 2009, Da Nang Port announced a receiving capacity of 45,000 DWT for general cargo ships, 2,000 TEUs (roughly speaking, equivalent to 20,000 DWT) for container ships and 75,000 GRT for passenger ships.

Table 6: Ships and passengers traveling through Da Nang Port

	Type of ship	**2007**	**2008**	**2009**
I	**Container ships**			
	Number of ships	290	303	366
	TEUs	53,372	61,881	68,000
II	**Cruise ships**			
	Number of ships	57	50	51
	Number of passengers	24,067	29,642	30,677
III	**General cargo ships**			
	Number of ships	1,505	1,542	1,780

Source: Da Nang Port (2010)

With regard to passenger cruisers, according to a report from Da Nang Port, the largest ship ever anchored at the port's pier after completion of the project was recorded at 55,728 GRT. Although concrete corresponding data for before the project was not available, it is recognized that such a ship is remarkably larger than the average size of 10,923GRT/ship (JICA study, 1998) which visited the port before its improvement. The average number of passengers per ship also increased from 422 in 2007 to 601 in 2009 indicating that larger ships can now be accommodated by Da Nang Port, thanks to the construction of the breakwater, dredging work and other installed facilities.

(3) Improvement of cargo handling capacity

Improvements have been observed in the areas of berth occupation ratio; crane capacity and average waiting time (Table 7).

The construction of the breakwater is appreciated by all port users. Before the project, bad weather made berthing impossible for a high number of days: 35 days (9.6%) in 1997 to 63 days (17.3%) in 1995 (JICA study, 1998). After the project completion, the situation improved: the rate was reduced to less than 25 days (6.8%) in 2009 and is expected to reach the optimal level of 5% in 2010.

[11] The projection at the appraisal implies an annual average rate of increase of more than 23% between 1998 and 2010.

The berth occupation ratio increased from 19.24% in 1997 to 55% in 2008, which is approaching the optimal planned level of 60% with the current five berths.

Crane capacity was stable at a level of 15 containers per hour for several years from 1997 to 2004. This increased to 20 containers/hour in 2005, after the new gantry crane was provided by the project. In 2007, the port invested in an additional crane with its own budget, increasing the handling capacity of the cranes to 40 containers per hour. Accordingly, the average waiting time per ship was reduced from 40 minutes per ship in 1997 to 30 minutes per ship from 2003.

Table 7: Improvement of port utilities

Type of data	Year										
	'97	**'99**	**'00**	**'01**	**'02**	**'03**	**'04**	**'05**	**'06**	**'07**	**'08**
Average annual berth occupation ratio (%)	19.24	45	48	48	50	50	53	53	53	55	55
Crane capacity: containers being handled per hour	15	15	15	15	15	15	15	20	20	35	40
Average waiting time (min/ship)	40	40	40	40	40	30	30	30	30	30	30

Source: Da Nang Port

(4) Improvement of access to Da Nang Port
Access to Da Nang Port is an important component of this project. It is also seen as part of the comprehensive urban and traffic development plan of Da Nang City and of the central region of Vietnam.

Before the project, vehicles of 13 tons and above had to access Tien Sa Port from the National Highway No. 1A (the main north-south artery of the country) to Tu Cau Bridge. The route is 39km longer than the current access route through Hoa Cam junction and Tuyen Son bridge. Traveling time by the new access route is recorded at a low of 35 minutes to a high of 60 minutes depending on the traffic volume[12]. It was also reported that the permitted loading capacity of container trucks is now higher due to better road conditions and that the number of traffic deaths and injuries has been reduced. Thus, costs borne by cargo and transportation companies as well as social costs are believed to have reduced.

3.3.1.2 Results of Calculations of Internal Rates of Return (IRR)
(1) Financial Internal Rate of Return (FIRR)
At the feasibility study and appraisal stages, the FIRR was not calculated. At the ex-post evaluation stage, the evaluation team attempted a calculation based on (i) the actual investment cost and O&M cost related to Tien Sa Port (excluding those related to roads and bridges) as the cost items, and (ii) port revenue from cargo handling collected by Da Nang Port (operation and maintenance agency) as the benefit item. The value turned out to be 7.01%. This calculation excludes port revenues collected by the Da Nang Port Authority (administrative body; see *3.5 Sustainability*), such as navigation fees, due to unavailability of figures. Considering this, the real FIRR value of the improvement of Tien Sa Port might be higher than 7%, and is thus satisfactory.

(2) Economic Internal Rate of Return (EIRR)
At the appraisal, the EIRR was estimated to be 17.3% with time and cost savings on vessels and

[12] Travel speed was measured by the ex-post evaluation team on 21 April 2010.

vehicles (through access roads) as benefits. However, due to the fact that data needed for quantitative analysis was not available, analysis for the economic internal rate of return was not possible.

3.3.2 Qualitative Effects

The ex-post evaluation team conducted a number of in-depth interviews, meetings and group discussions with representatives of the parties concerned, including the project management unit, port management personnel, local authorities, and direct and indirect beneficiaries of the project (Table 8).

Table 8: Respondents of qualitative surveys

Type of respondents	Number of interviews	Type of interviews
PUM 85 (leaders and staff)	4	SSI
Import/ export companies	3	SI
Cargo companies	7	SI
Shipping companies	2	SI
Industrial parks/ developers/ investors	4	SSI
Da Nang Port leaders and staff	3	SSI
Crane operators	3	SSI
Drivers	3	SSI
Local authorities		SSI
People's Committee of Da Nang City	1	SSI
Department of Transportation	1	Meeting, SSI
Department of Enlivenment	1	SSI
People's Committee of the An Hai Bac commune	2	SSI
Resettled people	4	FGD
	2	SSI

Note: SSI=Semi Structured Interview, SI=Structured Interview, FGD=Focus Group Discussion

(1) Utilisation of Da Nang Port

All of the companies interviewed acknowledged improvements in port capacity and accessibility, which are a combined effect of access road construction and improvement. For the shipping companies, such improvements help reduce their cost per unit of goods. For transportation companies, there are more customers, and more contracts for transporting goods to and from Da Nang Port have been signed since completion of the project.

However, some of the respondents, especially direct port users such as import/export, shipping and cargo companies are not satisfied with port services. The port's fees, administrative procedures, and attitude of staff are problems cited. According to the port managers, efforts are being made to improve port services by applying the management standard ISO:9001:2000.

(2) Capacity of port personnel

A series of training on port management and technical capacity development was organized for port managers, engineers and technicians from 2000 to 2009. The capacity of the personnel of Da Nang Port is consequently reported to be considerably improved. The port engineers, technicians and drivers who were interviewed said that they are now confident in operating such equipment as the gantry cranes and transfer cranes and maintaining them in an effective way.

(3) Satisfaction of resettled people

Households affected by the project were resettled in the two urban communes of An Hai Bac and Man Thai. The local residents at the resettlement sites, including original and resettled residents, evaluated the situation as positive. People reported better infrastructure (roads, street lighting, drainage systems), better safety and more favorable access to social service institutions such as schools, health stations and clinics.

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

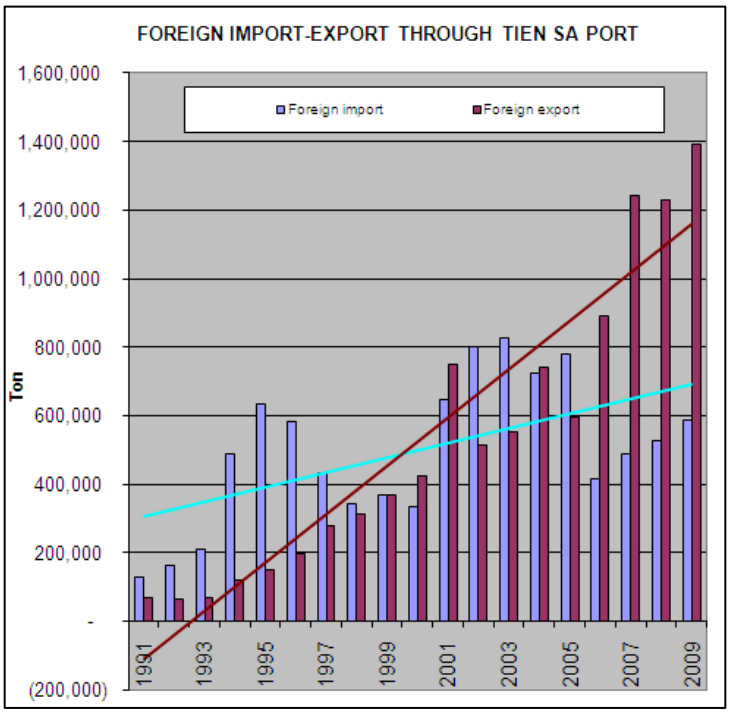
3.4 Impact (Rating: a – as part of the effectiveness rating)

3.4.1 Intended Impacts

(1) Increase of trading value through Da Nang Port

As described in *3.3 Effectiveness*, the volume of cargo, the number of ships and the number of passengers travelling through Da Nang Port all increased after project completion, particularly during the last 5 years. The improvement in container handling facilities at Tien Sa Port has played an important role in facilitating this improvement.

According to the records of Da Nang Port, the volume of foreign imports and exports occupied up to 63% of the total for the port in 2009. The trend of the absolute value of the import-export volume has also been positive during the last 10 years, from 2001 to 2009. Notably, a shift from a higher import volume to a higher export volume has been observed (Figure 5). At the same time, it was reported that the total import and export value at the Lao Bao cross border gate (border to Laos on the East West Economic Corridor) has increased from USD 201 million in 2000 - 2004 to USD 737.5 million in 2005 – 2009. This trend reflects the impact of the East West Economic Corridor (or inter-Asia highway) and of Da Nang Port as an exit from the highway to the world.



Source: Da Nang Port

Figure 5: Foreign import-export through Tien Sa Port

(2) Achievements in promoting the economic development of central Vietnam

Annual income and revenue from Da Nang Port.

In terms of annual income, Da Nang Port reached the predicted level in 2007 and the port's income has been increased gradually ever since: VND 160,046 million in 2007 and VND 176,831 million in 2008, compared to the predicted VND 152,142 million and 160,545 million in 2007 and 2008, respectively. It is also noted that the port's annual income has increased by 3.82 times from VND 52,679 million in 1998 to VND 201,170 million in 2009 (Table 9).

Table 9: Annual income and revenue of Da Nang Port

Unit: Million VND

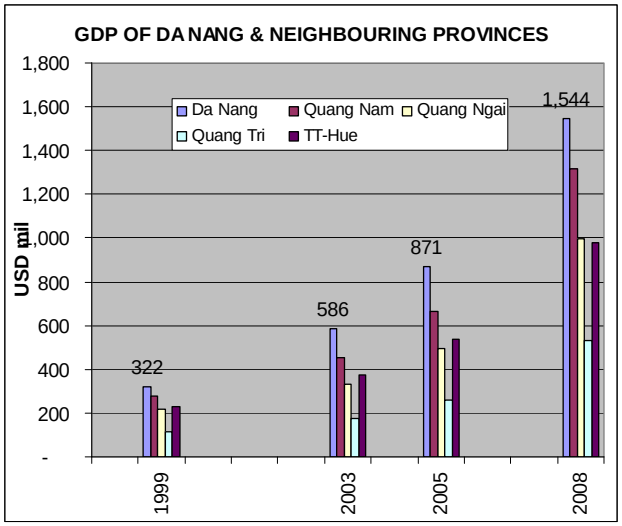
	1998	1999	2003	2004	2005	2006	2007	2008	2009
Income prediction	76,510	84,914	118,527	126,931	135,335	143,738	152,142	160,545	168,949
Actual income	52,679	56,401	85,000	94,704	98,417	119,018	160,046	176,831	201,170
Revenue	5,542	4,882	3,380	3,756	4,101	3,378	4,737	7,231	8,700

Source: Annual reports of Da Nang Port

The contribution of the port to the local revenue has increased from VND 3,380 million in 2003 to VND 7,231 million in 2008 and VND 8,700 in 2009, when the advantage of a 5-year tax exemption (granted by the People's Committee of Da Nang City) was due (Table 9). According to the local government and the port management board, the port's income, as well as its contribution, would increase in 2010 and the years beyond, when the receiving capacity of the port is further improved and the annual throughput of the port reaches the target of 4.5 million tons.

Foreign direct investment (FDI). The number of FDI companies in Da Nang increased from 28 in 2000 to 46 in 2008. The number of FDI companies in other coastal provinces of the central region also rocketed from 47 to 171 during the same period. This shows the impact of the comprehensive development of infrastructure in Da Nang City as well as socio-economic development policies, among which this project played an important role.

GDP growth. A strong trend of GDP growth has been observed in the central region, particularly in Da Nang City. In 1999, before the implementation of the project, the GDP of Da Nang City was recorded at USD 322 million. The figures for 2005 and 2008, i.e. the years after project completion, were remarkably higher: USD 871 million and USD 1,544 million respectively (Figure 6).



Source: Ministry of Planning and Investment (MPI)

Figure 6: GDP growth of Da Nang and its neighboring provinces

3.4.2 Other Impacts

(1) Reduction of traffic pressure and traffic accidents

As mentioned earlier, the construction of the port access roads (the Da Nang bypass, the Ngo Quyen access road and bypass, Tuyen Son bridge, and the Hoa Cam junction) has helped reduce traffic pressure in the urban areas of Da Nang. Although traffic surveys were not conducted in the locations of the project outputs, the impact of the project of the traffic systems of Da Nang City and the central region of Vietnam can be considered to be positive.

(2) Impact on the Natural Environment

The environmental impact assessment (EIA) for this project was conducted by the Ministry of Transportation (with consultation with the People's Committee of Da Nang City, which in turn was advised by the city's Department for Environment and Natural Resource Management) in May 1998. The EIA was approved by the Ministry of Science, Technology and Environment in

October 1998. According to the EIA report, the environmental impact of the project is assessed to be “small”.

Two environmental monitoring reports were conducted in 2002 and 2008, both by Da Nang Port. The reports stated that most of the compulsorily monitored environmental indicators had values within the acceptable levels of the Vietnamese standard (TCVN 5943 – 1995). Exceptions to this include the quality of surface water at Tuyen Son Bridge (2002 monitoring report) due to the construction of the bridge and the value of oil at Tien Sa Port (1.2 time higher than the permissible level - 2008 Environmental Monitoring Report of Da Nang Port).

According to the Department for Environment and Natural Resources of Da Nang City, the quality of surface water at Tuyen Son Bridge has returned to normal quality, mainly due to the natural rehabilitation capacity of the river after the completion of construction. However, no action to reduce the oil level at Tien Sa Port was reported.

(3) Impact of Land Acquisition and Resettlement

The land acquisition and resettlement for this project was carried out based on the Resettlement Action Plan (RAP) prepared by People’s Committee of Da Nang City as part of its City Development Plan. As described in *3.2.1 Outputs*, due to the construction of additional outputs and the technical modifications of some of the construction, the RAP was revised accordingly. The RAP was explained to people affected each time, and in total, 5,445 households were relocated because of this project. There was a mixture of positive and negative impacts for the land acquisition and resettlement of this project. The policies and methods applied by People’s Committee of Da Nang City are regarded as an example of good practice. Nevertheless, land acquisition remains one of the main reasons for delay and for the loss of livelihood for some of the resettled people.

Land acquisition and compensation policy

Da Nang City has been regarded as one of the most successful local governments in the field of land acquisition and resettlement for large construction projects. For this project, the city applied a flexible compensation policy with different options and with compensation levels that were close to the market price of land. In addition, the city introduced policies that provided the resettled communities with reasonable access to social services such as education and health care. Vocational training and job creation programs have also been implemented to provide assistance to resettled people who seek alternative types of livelihood, even though this was not as effective as expected due to limited investment[13].

Clear and transparent information on the project purpose and its resettlement plan was another successful factor. People tended to accept the resettlement plan and the compensation levels because they support the city’s development policy. Such efforts have reduced the number of cases of disputes and resistance from local people, thus accelerating the progress of land acquisition and the handing over of resettlement sites to the project management units for construction. Delays in resettlement, however, did happen (see .*3.2.3 Project Period*).

Landscape

Landscape, both at the resettlement sites and the project sites, was improved. Population pressure on the urban areas of the city was also reduced.

Livelihoods of resettled people

Sustainable livelihoods for resettled people remains an issue, though the level of impact on

[13] The land acquisition and resettlement process is also analyzed in JICA Vietnam Office, Land Acquisition and Resettlement: Good Practices of Da Nang Port Project.

different groups of affected people are not the same.

Those with regular income from salaries and wages were not greatly affected by resettlement. For some households, compensation even provided them with better accommodation. Similarly, those whose income comes from petty trading and retail activities also found it not too difficult to adapt to the new living conditions.

However, those who were dependent on an agricultural income were greatly affected. Losing their most important means of production, cultivation land, a number of resettled households faced a certain degree of difficulty in the transition period. This problem was observed particularly among people who were relocated from the construction site of the Da Nang bypass, where, unlike the other construction sites of this project, many people were still engaged in agriculture at the time of the land acquisition. In this context, assistance from the local government (such as vocational training, job creation) was not effective enough for them to get alternative sources of income.

3.5 Sustainability (rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

(1) Tien Sa Port

Da Nang Port, a state-owned company under VINALINES[14], is responsible for the operation and maintenance of Tien Sa Port.

Operation of the Port and maintenance of infrastructure and facilities are mainly performed by Da Nang Port. Only a few major repairs of important equipments are outsourced. For example, crane operators are responsible for daily and weekly maintenance of cranes; the port's technicians and engineers are responsible for monthly and quarterly, bi-annual and annual maintenance and repairs. Recently, annual maintenance of the quayside container crane No 1 (the one procured by this project) was conducted by the engineers of Da Nang Port.

(2) Roads and bridges

The roads and bridges developed by this project, except the Da Nang Bypass, are operated and maintained by the Department of Transport (DOT) of Da Nang City as assigned by the Vietnam Road Administration (VRA) of the Ministry of Transport. The Da Nang Bypass is operated and maintained by the Regional Road Management Unit No. 5 (RRMU 5) of VRA.

3.5.2 Technical Aspects of Operation and Maintenance

(1) Tien Sa Port

Among 732 employees[15] of Da Nang Port, 381 staff are in charge of the operation and maintenance of Tien Sa Port. During the project implementation, 12 training courses ranging from 1 month to 6 months were organized, and 114 staff were trained. Besides the project, training was also provided by Da Nang Port. All O&M workers are required to have a training certificate (which requires 15 training days).

In 2005, within the framework of the project, the container management software CATOS was

[14] VINALINES is a state-owned ship line and port operation company directly under the Prime Minister's Office. VINALINES is a very business-oriented organization that is responsible for mobilization of capital, investment, running business and paying back the loans according to the Law on Enterprises. VINALINES is different from VINAMARINE (the Vietnam National Maritime Administration), which is a state sectoral management body under the Ministry of Transport, responsible for regulating crossing-border procedures, cruising safety, environment quality etc. for ships entering Vietnam. In Da Nang, such services are delivered by Da Nang Port Authority, which is a branch of VINAMARINE..

[15] Excluding 441 contract-based staff.

installed and applied. For the operation of this newly-introduced computer system, Da Nang Port employed new staff and also trained existing staff. Currently, the computer system is operated by 15 operators. So far, the port operation system is reported to have been operated without a problem.

Based on the observations of and hearings by the evaluation team, the technical capacity of O&M staff is assessed to be sufficient. However, there is a small amount of concern about whether or not the technical capacity for O&M is constantly monitored: for example, a crane operator interviewed did not know where the O&M manual was, nor felt it necessary to look at it.

(2) Roads and bridges
There seems to be no particular technical problem in the O&M of the roads and bridges under this project, as they are classed with other roads and bridges and do not require any special care.

3.5.3 Financial Aspects of Operation and Maintenance
(1) Tien Sa Port
Da Nang Port is financially independent and bares its own expenses for O&M. The O&M budget is taken from the port's income, which includes: (i) assistance tug boat fees, (ii) cargo handling fees, and (iii) other service charges[16]. According to the port's leaders, Da Nang Port is responsible for repaying the loan for this project. Therefore, keeping all the infrastructure, facilities and equipment in good condition has been given great attention.

The positive financial status of Da Nang Port (Table 9) allows a sufficient budget for O&M. The O&M budget from 2003 to 2009 fluctuated from a low 8% to a high 36% of the port's annual income and is summarized in Table 10below:

Table 10: O&M budget of Da Nang Port from 2006 to 2010

Planned O&M Budget	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Mechanical repairs	3,200	1,500	3,134	3,185	3,785	3,940	3,200
Infrastructure	27,210	14,815	14,750	16,110	8,530	18,626	68,497
Total	**30,410**	**16,315**	**17,884**	**19,295**	**12,315**	**22,566**	**71,697**
% of O&M Budget to annual income	36	17	18	16	8	13	36

Source: Da Nang Port

(2) Roads and bridges
Although no information on the O&M budget for the roads and bridges under the project was available, the DOT of Da Nang City mentioned that the budget was sufficient.

3.5.4 Current Status of Operation and Maintenance
(1) Tien Sa Port
According to the O&M staff interviewed, the periodic maintenance system consisting of (i) a daily quick check and oiling of equipment, (ii) maintenance after every 150 hours or every week, and (iii) maintenance every three months, is performed as planned. Also, the depths of the navigation channels are regularly measured and the channels dredged when necessary.

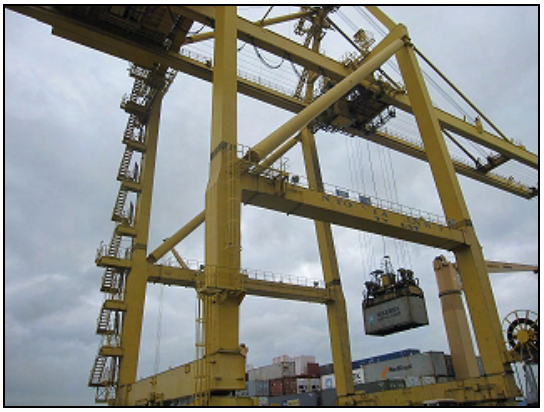
Recent development works Da Nang Port implemented at Tien Sa Port include the following:

[16] Port income is classified in the following five categories: (i) navigation fees, (ii) piloting fees, (iii) marine safety fees, (iv)assistance tug boat fees, and (v) cargo handling fees. Da Nang Port collects (iv) and (v), while Da Nang Port Authority collects (i), (ii) and (iii).

(i) Dredging: from April 2009 to May 2009, dredging for Berth 2 and Berth 3 was conducted as part of O&M work.
(ii) Cranes: in addition to the crane provided by this project at Berth 5, the port invested in one additional gantry crane (also at Berth 5) and two other cranes at Berth 4 (Pier 2) to increase handling capacity, aiming at the target of 4.5 million tons in 2010.
(iii) ISO 9001:2000 and further administrative improvement: Da Nang Port introduced and applied a management system with the ISO 9001:2000 standard in July 2006. In 2010, the port will once again review and revise its administrative management to reduce complications in administrative procedures and to better answer customer demands.

Current conditions at Tien Sa Port are good except for the following:
(i) Breakwater: heavily damaged by a storm in 2009. This was inevitable as the storm was exceptionally strong with a one in a one hundred year probability. Repairs will have taken place with Japanese grant aid project by the next monsoon season this year.
(ii) Poor coordination between the power generator and the gantry crane: this problem halves the efficiency (container-handling capacity) of the crane in the case of electrical power outages. However, this is not a major problem as outages occur only for half a day per month. The port has not taken any measures to solve this problem.
(iii) Fenders: many are cracked or broken due to their short life cycle (i.e. 4-5 months). Da Nang Port replaces several pieces every year.


Damaged Breakwater


Operation of the gantry crane

(2) Road and bridges
No problems are observed/ reported on the O&M status of the project roads and bridges.

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

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

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

4.2 Recommendations

4.2.1 Recommendations for the related agencies

(1) Recommendations for Da Nang City
The loss of livelihood for some of the resettled people remains a problem. It is recommended that the People's Committee of Da Nang City takes measures such as providing practical

vocational training to more resettled people and introducing alternative livelihoods for resettled farmers.

(2) Recommendations for Da Nang Port

The working attitude of port staff needs to be improved in order to heighten the level of customer satisfaction. In addition, proper action should be taken in order to maintain the environmental quality in the port area, especially when environmental indicators are reported to be higher or lower than the permissible levels. This could be done through the process of administrative standardization for ISO 9001:2000.

4.2.2 Recommendations for JICA

It is recommended that the JICA Vietnam Office keeps monitoring the progress of repair work on the damaged breakwater.

4.3 Lessons Learned

(1) The land acquisition and resettlement approach should be flexible and responsive to the needs of affected people.

The progress of project implementation strongly depends on the progress of land acquisition and resettlement. The approach applied by Da Nang People's Committee shows that factors for successful land acquisition and resettlement in urban areas may include:

- Good commitment on the part of the local leadership to ensure flexibility in responding to people's needs
- Appropriate local development policies: people accept moving if they think the project will bring better development opportunities for a larger population, including themselves.
- Compensation taking the market price into account
- Equal treatment and fair compensation to resettled people

In addition, local authorities should pay better attention to assisting affected people, especially those whose livelihood was dependent on agriculture, in seeking alternative sources of income.

(2) Urban planning should be comprehensive to maximize the benefits of infrastructure.

In this case, the Hai Van Tunnel – Bypass road – Flyover Junction – Bridge – Access road to the port were developed in a coordinated way by two Japanese ODA loan projects, bringing combined effects including the improvement of accessibility from/to the port and the reduction of congestion in the city.

(3) Capacity of project management should be assessed.

Some delays are reported to be due to the shortage of manpower of PMU. Therefore, in addition to the capability of staff, an appropriate allocation of manpower should be taken into account at the project appraisal stage.

Comparison of Original and Actual Scope

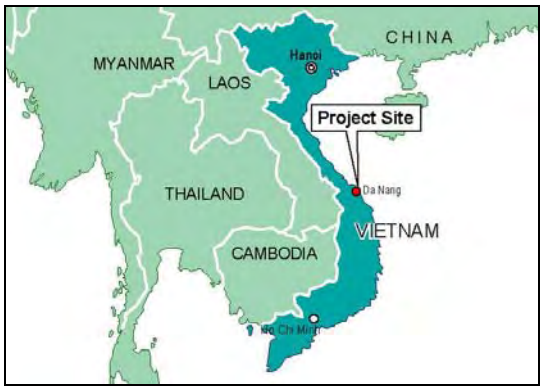
Item	Plan	Actual
1) Outputs a) Improvement of Tien Sa Port	Breakwater (250m), repair of Piers 1 & 2, container terminal (45,414m^2), dredging (55,400m3), cargo handling equipment, etc.	Breakwater (471.9m), repair of Piers 1& 2, container terminal (92,000m^2), dredging (222,565m3), cargo handling equipment, etc.
b) Improvement of access roads	Improvement of Ngo Quyen road (12km) and Hoa Cam junction, construction of Tuyen Son bridge (520m)	Improvement of Ngo Quyen road (12.3km), construction of Hoa Cam flyover, Ngo Quyen bypass (2,865m), Da Nang bypass (18.3km), Tuyen Son bridge (519.1m)
c) Construction of resettlement areas	For 83 households	For 3,813 households
d) Consulting services	Foreign 146 MM, Local 250 MM TOR: Tender assistance, implementation supervision	Foreign 211 MM, Local 658 MM TOR: same as planned
2) Project Period	March 1999 – October 2003 (56 months)	March 1999 – December 2005 (81 months)
3) Project Cost		
Foreign Currency	6,660 Million Yen	2,739 Million Yen
Local Currency	6,977 Million Yen (698Billion VND)	7,539 Million Yen (942 Billion VND)
Total	13,637 Million Yen	10,278 Million Yen
ODA Loan Portion	10,690 Million Yen	9,210 Million Yen
Exchange Rate	1 VND= 0.01 Yen (As of October 1998)	1 VND = 0.008 Yen (Average during period from 1999 to 2007)

Vietnam

Ex-Post Evaluation of Japanese ODA Loan Project
"Hai Van Pass Tunnel Construction Project (1)(2)(3)"

Evaluator: Vietnam-Japan Joint Evaluation Team 2009

1. Project Description



Project Site

Main Tunnel (right) and Evacuation Tunnel

1.1 Background

National Highway No.1 is a major artery that crosses Vietnam from North to South. In Central Vietnam, it forms part of the East West Economic Corridor passing through Vietnam, Laos, Thailand and Myanmar[1].

The Hai Van Pass segment of National Highway No.1 (approx. a 20-km segment in central Hue-Da Nang with a 475 meter- high peak) is a narrow and steep mountain road with many sharp curves. Moreover, during the rainy season, falling rocks and shoulder collapses are frequent occurrences. This makes it the most dangerous segment of National Highway No. 1 and very difficult to maintain. Traveling on this segment took approximately 1 hour by regular vehicle. It was, therefore, a bottleneck, impeding smooth transportation on National Highway No.1 and it thus held up development of the Central region.

1.2 Project Outline

To establish traffic safety and efficiency for National Highway No.1 at the Hai Van Pass section located between central Hue and Da Nang City in Central Vietnam through the construction of road tunnel(s), road bridge(s) and access roads, thereby contributing to economic development of the region.

Logical Framework Applied for Ex-Post Evaluation

Goal	Economic development in Central Vietnam and the whole country
Purpose	1) To establish traffic safety and efficiency for National Highway No.1 at the Hai Van Pass section 2) To meet the requirements of a drastic increase in vehicle traffic demand in the future (to 2025)
Outcome	1) Reduction of traffic accidents and losses from accidents 2) Reduction of travel time/ increase in travel speed

[1] A component of the Expansion Mekong Regional Development Plan. Based on the Feasibility Study conducted by ADB, several Japanese ODA loan projects are involved: Da Nang Port Improvement Project, Hai Van Pass Tunnel Construction Project and the 2nd Mekong International Bridge Project (Laos and Thailand).

	3) Reduction of vehicle operation costs (VOC) 4) Reduction of days of impassability due to weather conditions and accidents
Outputs (planned at appraisal)	1) Construction of tunnels and related facilities 2) Construction of approach roads and bridges (including Lang Co Bridge) 3) Construction of resettlement area 4) Consulting services
Inputs (Planned at appraisal)	Total project cost: 37,981 million yen out of which, Japanese ODA Loan: 31,824 million yen GOV contribution: 6,157 million yen ** The cost is the estimate as of the appraisal for the second Loan Agreement, as the details of the project scope including the tunnel route had been decided after the first Loan Agreement was concluded and the project started. See 3.2.2.3 Project Cost for the reason for a big gap between the planned Japanese ODA Loan and disbursed amount (as shown in the table below).*

	Phase 1 (LA I)	Phase 2 (LA II)	Phase 3 (LA III)
Approved Amount/ Disbursed Amount	5,500 Million Yen / 5,487 Million Yen	10,000 Million Yen / 8,162 Million Yen	3,359 Million Yen / 1,666 Million Yen
Exchange of Notes Date/ Loan Agreement Signing Date	January 11, 1997 / March 26, 1997	March 29, 1999 / March 30, 1999	March 28, 2002/ March 29, 2002
Terms and Conditions	Interest Rate: 2.3% p.a. Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied	Interest Rate: 0.75% p.a.* or 1.8% p.a. Repayment Period: 40 years* or 30 years (Grace Period: 10 years) Conditions for Procurement: Bilateral Tied* or General Untied	Interest Rate: 1.8% p.a. Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied
Borrower / Executing Agencies	The Government of Socialist Republic of Vietnam / Ministry of Transport		
Final Disbursement Date	September, 2003	July, 2007	July, 2007
Main Contractor (Over 1 Billion yen)	Hazama Corporation (Japan) - Civil Engineering Construction Corporation No.6 (CIENCO 6) (Vietnam) (JV) / ABB OY(Finland), Kinden Corporation (Japan)- Vietnam Industrial Construction Corporation (Vietnam) (JV) / Dong Ah Construction Ind. Co., Ltd.(Korea) - Song Da Construction Corporation (Vietnam) (JV) / Thanh Long Construction (Vietnam) - Truong Son Construction Corp.(Vietnam) (JV) / Matsushita Electric Industrial Co. Ltd.(Japan) - Itochu Corporation (Japan) (JV)		
Main Consultant (Over 100 million yen)	Nippon Koei Co., Ltd.(Japan) - Louis Berger International Inc.(United States) - Transport Engineering Design Corporation (Vietnam) (JV).		
Feasibility Study, etc.	1996 World Bank		
Related Projects	Da Nang Port Improvement Project (Japanese ODA Loan; Loan Agreement signed in March 1999)		

Note: *1) For Consulting Services

2. Outline of the Evaluation Study

2.1 Evaluator

The Vietnam-Japan Joint Evaluation Team 2009 consisted of three Working Groups, each of which evaluated different projects. This project was evaluated by the Hai Van Pass Tunnel Group joined by the following members:

Ms. Nguyễn Thanh Hằng, Ministry of Transportation (MOT)
Mr. Nguyễn Đình Thảo, PMU 85
Ms. Huỳnh Thị Ngọc Hoa, PMU 85
Mr. Bùi Xuân Trường, Vietnam Road Administration (VRA)
Mr. Trương Quang Hưng, Ministry of Planning and Investment (MPI)
Mr. Phan Đức Hảo, MPI
Mr. Nguyen Ngoc Hai, Ministry of Transport (Evaluation Advisor)
Mr. Bui Duc Tho, National Economic University (Vietnamese Evaluation Consultant)
Mr. Mai The Cuong, National Economic University (Vietnamese Evaluation Coordinator)
Takako Haraguchi, International Development Associates (Japanese External Evaluator)

2.2 Duration of Evaluation Study

For the ex-post evaluation, the study was conducted as per the following schedule.

Study Period: September 2009 – June 2010
On-Site Survey: November 30 – December 4, 2009 and January 16 – 27, 2010

2.3 Constraints during the Evaluation Study

As this was a joint evaluation with the dual purposes of (i) fulfilling the evaluation task of JICA and (ii) developing evaluation capacity of personnel concerned in Vietnam through actual involvement in evaluation activities, a large part of the study period was spent in the training of evaluation team members and in discussions within the team. At the same time, data/ information for evaluation in some aspect, including comprehensive and detailed data on operation of Da Nang Port (related to the evaluation of Effectiveness and Sustainability), were not provided on time. Therefore, the evaluation team could not complete some analyses such as recalculation of internal rates of return.

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

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Vietnam

The evaluation team examined major policy/ planning documents from the project appraisal stage and the ex-post evaluation stage, such as the Socio-Economic Development Plan (SEDP) of Vietnam, SEDPs of Thua Thien Hue Province and Da Nang City, respectively, and the National Transportation Master Plans [2]. All of these documents mention the development of the Central region as a key priority, and the city and provincial SEDP regard the development of the Hai Van Pass Tunnel as an important measure in achieving this. Also, as

Hai Van Pass

[2] The Transportation Master Plan after 2001 refers to *The Study on the National Transport Development Strategy in the Socialist Republic of Vietnam (VITRANS) 1* (2001) and *VITRANS 2* (2010) prepared with JICA technical assistance.

mentioned in 1.1, this project is consistent with the Mekong regional development plan because the Hai Van Pass Tunnel constitutes a part of the East West Economic Corridor.

3.1.2 Relevance with the Development Needs of Vietnam

The feasibility study for this project by the World Bank (1996) and the Master Plan on Development of the Central Viet Nam by JICA (1996) both forecasted an increase in traffic demand for the Hai Van Pass section. According to the World Bank study, the rate of traffic increase per year for 2010 would be 13.2% p.a. for passengers and 11% p.a. for freight. However, as mentioned in *1.1 Background*, the Hai Van Pass section was the section that created most difficulties on National Highway No. 1, and was a bottleneck for middle- and long distance transportation.

3.1.3 Relevance to Japan's ODA Policy

In the Japanese country assistance policy for Vietnam (1994) the development of infrastructure is one of the five priority areas. As of FY1998, 30% of total Japanese ODA Loans since 1993 had been designated to the transportation sector.

This project has been highly relevant to Vietnam's development plans and development needs as well as to Japan's ODA policy, therefore its overall relevance is high.

3.2 Efficiency (Rating: b)

For a comparison of the plan and the actual outputs and inputs, which forms the basis for the efficiency evaluation, we considered the project plan of LA II, instead that for LA I, as the "original plan". This was because at the time of the LA I appraisal, the tunnel route had not yet been decided, there being two alternatives. These alternatives were quite different in design, cost estimation and construction duration. The tunnel route was decided upon using a Special Survey conducted as part of the LA I implementation, and this became the basis of the LA II appraisal, which is comparable to reality

3.2.1 Project Outputs

The main features of the Hai Van Pass Tunnel are as follows:

Main Tunnel : 2 Lanes (3.75m wide lanes, 1.25m wide shoulders), 89.0m^2 cross section, 6,280m long, Lay-by with 400m spacing

Evacuation Tunnel[3] : 15.5m^2 cross section, 6,286m long

Vehicular and Pedestrian Crossing Passages: 1Vehicular/Substation passage - 15.5m^2, 11 Pedestrian passages - 8.1m^2 each

Ventilation System : Jet-fan Longitudinal Ventilation System with one intermediate ventilation adit (Supply and exhaust, 36.2m^2, 1,810m long), and three Electrostatic precipitators (each 57.7m^2, 153m long)

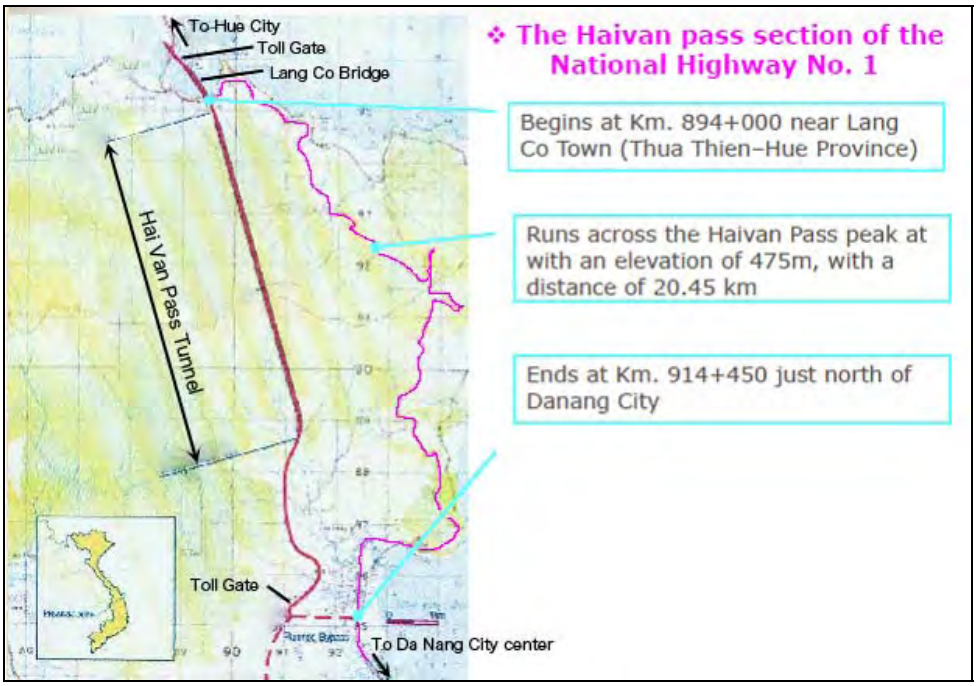
The outputs originally planned, including the construction of tunnels and related facilities, the construction of approach roads and bridges, the construction of a resettlement area, and consulting services were completed mostly as planned.

There were small modifications and additional works, as shown in Table 1, to better meet the actual situation and demands, and those changes are justifiable[4].

[3] It is planned that when traffic in the Main Tunnel reaches full capacity, the Evacuation Tunnel is to be transformed to a Second Main Tunnel, and the capacity is thus to be doubled.

[4] For example, landscaping and monuments were added because the tunnel, being the first mountain tunnel in Vietnam, had a monumental significance for Vietnamese people. Also, the construction of three additional temporary

In addition to the planned outputs, by using the residual project budget, the Lang Co Bypass (10,935.98m in total length) was built as part of the project and completed on 31 May 2008. The objectives of the Lang Co Bypass were to i) provide support for running and maintaining the National Railway west of Lap An Swamp, especially in the case of railway accidents and to ii) maximize the benefits of this project by contributing to the improvement of the living conditions of inhabitants living to the west of Lap An Lagoon, right next to the project location, who were separated from nearby regions due to there being no road connection to the inland and Highway No.1.



Source: PMU 85

Figure 1: Map of the Project Site

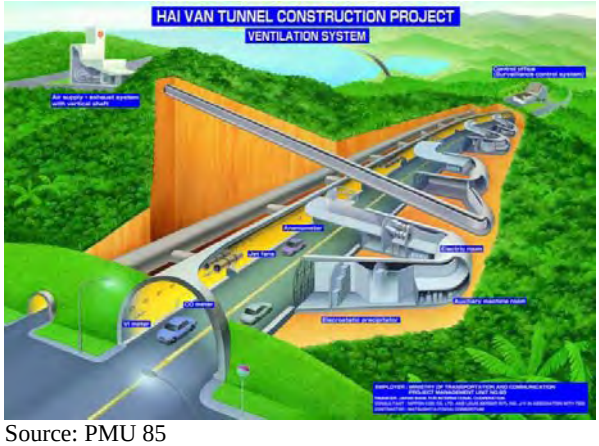
Table 1: Comparison of Planned and Actual Project Outputs

Package	Plan	Actual
Contract Package IA	**Construction of North Tunnel Section** - 3,857 meters long, 2-lane main tunnel - 3,857 meters long evacuation tunnel - 403 meters long access road to adit building - Other related construction.	Same as planned with small modifications on access road to adit building (506 meters long) and additional works: - Landscaping of North Portal Plaza - Slope protection - Project Monument - Additional 3 Temporary Cross Passage from Main Tunnel to Evacuation Tunnel
Contract Package IB	**Construction of South Tunnel Section** - 2,417 meters long 2-lane main tunnel - 2,429 meters long evacuation tunnel - Other related construction.	Small modification and some additional works: - 2,379 meters long 2-lane main tunnel - 2,411 meters long evacuation tunnel - Landscaping of South Portal Plaza - Project Monument

cross passages from Main Tunnel and Evaluation Tunnel enabled the assignment of additional construction teams and thus accelerated the construction works.

Package	Plan	Actual
Contract Package IIA	**Construction of Lang Co Bridge Section** - Lang Co Bridge, 876.390 meters long, - Two lane roadway road width = 12.5m - A northern toll plaza; - 187m^2 enclosed car port	Same as planned with some minor additional works
Contract Package IIB	**Construction of Southern Highway Section** - Six bridges, totaling 959.390 meters length; - Two lane roadway, 3,922 meters length; road width of 12.5m. - A southern toll plaza - Pavements and road signs	Same as planned
Contract Package III	**Electrical works** 1. Electrical System 2. Lighting system 3. CCTV System 4. Lighting Control System 5. Fire Alarm and Detection System 6. Telecom System 7. Traffic Control System 8. Radio Rebroadcast System 9. Tunnel Power Distribution Monitoring and Control System 10. Main Supervised Control and Data Acquisition (SCADA) System	Same as planned
Contract Package IV	**Mechanical works** 1. Water Supply and Treatment 2. Tunnel Ventilation System	Same as planned
Contract Package V	**110/22kW substation and 110kV transmission lines**	Same as planned
Contract Package VI	**Maintenance equipment and vehicles**	Same as planned
Contract Package VII	**Infrastructure of resettlement area**	Same as planned
Additional Scope	**Construction of Lang Co Bypass** with a total length of 10,935.98m.	Same as planned

Source: PMU 85



Source: PMU 85

Figure 2: Tunnel Layout and Ventilation System

North Tunnel Section and Lang Co Bridge
(Photograph provided by PMU85)

3.2.2 Project Inputs

3.2.2.1 Project Period (Sub-rating: b)

According to the appraisal of LA II, the project starting date (signing of LA I) was March 1997[5], and the completion date[6] was planned to be November 2003, a total period of 81 months.

The actual completion date of the project in terms of the original scope was June 2005, with a total period of 100 months. The project was therefore 19 months or 23% longer than the plan. The completion of the additional scope – the Lang Co Bypass - was in May 2008.

Among all the Contract Packages, Packages 2A (Lang Co Bridge) and 2B (Southern Highway) had significant delays due to the insufficient financial and human resource capacity of the Contractor. As the bid price offered by the Contractor was too low in comparison with the cost estimates, the Contractor experienced difficulties in arranging financial resources for the package. In addition to this, the organization of the project team was not stable during package implantation, with frequent changes of Project Manager and some key staff. However, as these packages were not critical and were completed before the completion of the tunnel-related packages, they did not have a downstream impact on the entire project period.

As technical problems that arose in the courses of construction were due to unforeseeable conditions such as underground water in the ventilation adit, hard rock excavations, and a landslide in the South Tunnel Portal due to soft ground, delays in progress are acceptable and reasonable. Time extensions for these additional or unforeseeable conditions were strictly controlled. The construction schedule was strictly controlled and the construction period alone was in accordance with the approved schedule.

Table 2: Planned and Actual Period of the Project

	PLANNED	ACTUAL	REMARKS
OVERALL	Nov, 2003 (Signing of LA II)	June 2005 (Opening of the tunnel)	19 months behind (123% of plan)
Package 1A	30/09/2004	25/01/2005	4 months delayed due to underground water and hard rocks.
Package 1B	30/09/2004	25/01/2005	4 months delayed due to landslides at the soft ground section.
Package 2A	10/12/2003	31/12/2004	12 months delayed as Contractor encountered financial and human resource problems
Package 2B	25/03/2004	31/12/2004	9 months delayed as Contractor encountered financial and human resource problems.
Package 3	13/04/2005	15/05/2005	1 month delayed due to delayed approval of radio frequency
Package 4	12/3/2005	15/05/2005	2 months delayed due to additional emergency trials requested by Firefighting Police
Package 5	30/04/2004	19/08/2004	3.5 months delayed due to delays in connecting systems to the Lien Cieu Substation.
Package 6	17/08/2005	17/08/2005	As planned
Package 7	31/01/2002	29/04/2002	3 months delayed due to small modifications in quantity of work.

Source: PMU 85

Note: “Planned” for each package is the plan in the original contract.

[5] The actual starting month (March 1997) was the same as the plan made at the LA I appraisal (1996).

[6] Completion date is defined as the date of the opening of the tunnel.

3.2.2.2 Project Cost (Sub-rating: a)

According to the appraisal of LA II, the total project cost was JPY 37,981 million (excluding interest accrued during construction[7]), of which the Japanese ODA loan portion was JPY 31,824 million and the Government of Vietnam portion was JPY 6,157million.

The actual total project cost was JPY 17,472 million, of which the Japanese ODA loan portion was JPY 15,315 million and the Government of Vietnam portion was JPY 2,157 million. The total actual project cost was 54% lower than planned.

This big gap between the planned and actual project cost was mainly due to cost savings as a result of competitive bidding. However, unreasonably low bidding prices made project implementation difficult, especially in Packages 2A and 2B where local contractors won the bidding and this partly led to delays (see *3.2.2.1 Project Period*).

As shown above, although the actual project cost was 54% lower than planned, the project period exceeded the plan by 23%. Therefore, the 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

(1) Improvement of traffic safety and efficiency - Effective

Traffic accidents. The project has improved traffic safety. Before the project, according to Hai Van Pass accident reports of the Phu Loc Police Department (Thua Thien Hue Province) and the Lien Chieu Police Department (Da Nang City), on average during 2000-2004, there were 8.4 serious accidents and 5.2 deaths per year. These figures were reduced sharply after project completion: on average during 2005-2009, there were 3.2 serious accidents and 2.8 deaths per year on both the Hai Van pass and in the tunnel. There have been 29 accidents inside the tunnel since 2005. However, none of them were serious accidents. These figures show that despite the increase in traffic volume, serious accident cases decreased after the project.

Travel speed. The project has also been effective in terms of increased travel speed[8]. Before the project, the average speed of a vehicle passing the Hai Van Pass section (approximately 20km in total length) was 23km/hour. In 2009, the average speed passing through the section tunnel (approximately 12km in length) was 46km/hour, 15% higher than targeted (40km/hour).

Travel time. Consequently, travel time has been shortened as expected. Before the project, on average, it took 60 minutes to pass the project section. After the project, by using the tunnel, the time to pass the project section had been shortened to an average of 15 minutes[9].

Vehicle operation cost (VOC). Using the same approach applied at appraisal, the total VOC saving of the project was re-calculated at USD 456.1 million (2005 price), equivalent to USD 360.7 million (2001 price), which was lower than the plan (USD 386.9 million) possibly due to a slightly lower traffic volume than planned.

Traffic impassability. Before the project, the number of times that the Hai Van Pass was impassable[10] due to weather or accidents was 14 per year on average. After the tunnel opened,

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[7] Interest during construction was excluded because the executing agency did not record it as a project cost.

[8] The speed regulation at the Hai Van Pass Tunnel is a minimum 40 Km/h and a maximum 70 Km/h.

[9] This was confirmed by PMU85, semi-structured interviews with beneficiaries and direct measurements by the ex-post evaluation team.

[10] Traffic impassability is defined as the closure for five hours or longer.

there was almost no traffic impassability at Hai Van Pass except on one occasion. There were also almost no occurrences of traffic impassability inside the tunnel. From 2005 to date, the tunnel has had to be closed 50 times due to accidents or fires. Each time, however, the closure has been only for short time, ranging from 5 minutes to 45 minutes at the most according to Hai Van Pass Tunnel Management and Development Company (HAMADECO), the tunnel operator. Thus, it did not become impassable for traffic.

(2) Meeting future traffic demand - Effective

Traffic volume. Traffic volume in the Hai Van Pass section in 1998 was 2,024 ADT (average daily traffic in terms of the number of vehicles), and in 2008, this increased 91% to 3,892 ADT, of which 3,866 ADT was through the tunnel and 26 ADT was through Hai Van Pass. The Hai Van Pass Tunnel is a factor which contributed to the traffic volume increase. All of the transportation companies interviewed (8 companies) recognized that they had more customers (passengers) as a result of the Hai Van Pass Tunnel, because people traveled more often and their customers switched from railway to road.

Table 3 shows the actual and forecast traffic volume. The actual volume for the Hai Van Pass Tunnel was almost the same as forecast every year except 2008 and 2009, when Vietnam faced an economic crisis. The sum of the actual traffic volume from 2005 to 2009 through the Hai Van Pass Tunnel (17,712 vehicles) was about 97% of the forecast traffic volume for the same period (18,228 vehicles). In this aspect, the project was effective.

Demand forecast and tunnel capacity. The actual capacity of the tunnel is 14,500 ADT which is the same as the design. According to the forecast made at the LA II appraisal (based on the Special Survey conducted in 1998)[11], the tunnel can meet the traffic volume until 2025. Taking the above-mentioned actual traffic volume into consideration, the tunnel will meet traffic volume until 2025 as planned.

Table 3: Forecast and actual traffic volume

Unit: ADT

Year	Tunnel		Hai Van Pass
	Forecast (Special Survey Report, 1998)	Actual	Actual
Baseline			
1998			2,024
Actual			
2005	2,976	3,273	17
2006	3,278	3,274	23
2007	3,612	3,631	25
2008*	3,979	3,813	26
2009*	4,383	3,721	
Forecast			
2015	7,834		
2025	14,495	Full capacity	

Source: Special Survey Report (1998), PMU 85 and Hai Van Tunnel Management Company (HAMADECO)

Note: The traffic volume data for the Hai Van Pass after the opening of the tunnel seems low in spite of the fact that very few vehicles are actually observed on this route now. However, the evaluation team could not find any other data.

[11] After the Special Survey (1998), the Supplementary Study (2001) requesting the construction of a second tunnel (conversion of the Evacuation Tunnel to a 2-lane motorway tunnel for one-way traffic), modified the demand forecast. This new forecast suggested greater demand and estimated that the tunnel would be full by 2017. However, by comparing the actual traffic volume up to 2009 with the forecast demand of the Special Survey and the Supplementary Study, it appears that the Special Survey projection is more acceptable. The SSE (Sum of Squares for Forecast Error) of the Special Survey projection is 1.2 million, while the SSE of the Supplementary Study is 38 million, which means that the Special Survey projection is more accurate than the Supplementary Study projection.

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

(1) Financial Internal Rate of Return (FIRR)

In the FIRR calculation at appraisal, three cases were foreseen for the increase in the rate of tolls: the low case (with no rise in the toll rate), the middle case (a 3% increase) and the high case (a 6% increase). In fact, the low case applied (i.e., the toll rate has been maintained since the opening of the tunnel), and the corresponding FIRR at appraisal was negative.

At the ex-post evaluation, the FIRR was recalculated with updated data on investment costs, operation and maintenance (O&M) costs and toll revenues using the 2005 price. The result of the FIRR is positive at 0.2% which is better than the plan mainly because of a lower investment cost than was planned.

(2) Economic Internal Rate of Return (EIRR)

The EIRR was recalculated using the same method and conditions as applied at the appraisal.

The recalculated value was 12.6%, which was higher than planned (11.4%), possibly because of the lower investment cost as well as higher time saving values than planned (though the O&M cost was higher and VOC saving values were lower than planned).

Table 4: EIRR

Total		**Plan (2001 price)**	**Actual (2005 price)**
Costs	Investment capital	$ 170.8 mil.	$163.1 mil.
	O&M Costs	$23.4 mil	$ 30.89 mil
Benefits	VOC Savings	$ 386.9 mil.	$ 456.1 mil.
	Time Saving	$ 467.5 mil.	$ 501.3 mil.
	EIRR	11.4%	12.2%

Source: made by the ex-post evaluation team based on data provided by PMU 85, HAMADECO and JICA
Note: Project life: 20 years from the start of the operation of the tunnel.

3.3.2 Qualitative Effects

(1) Satisfaction of beneficiaries

The ex-post evaluation team conducted structured interview surveys with 31 drivers and 12 passengers using the Hai Van Pass Tunnel[12]. Recalling past experience, 40% of the drivers and 52% of the passengers responded that they had felt unsafe when they had passed the project section via the Hai Van Pass. After project completion, they used the tunnel and felt much safer. Of the drivers and passengers interviewed, 100% said they felt safe and comfortable using the tunnel.

In the same survey and other surveys (semi-structured interviews with 8 transportation companies), respondents said that they believed that using the tunnel saved VOC and that the toll fee was much less than VOC savings, though they could not give the exact amount.

Interviewees also mentioned that the Hai Van pass route had become safer with less traffic. Some transportation companies said they used the Hai Van Pass on request of tourist customers. Most vehicles using the Hai Van pass are now tourist cars. After project completion, the Hai Van pass has become a tourist site not only for foreigners but also for Vietnamese.

When asked to rate their degree of satisfaction with the project on a five-point scale, 64.5% of

[12] Although the sample size is too small to draw a statistically-significant conclusion (mainly due to time constraints), sampling was made randomly to enhance representativeness of interviewees.

drivers interviewed (20 respondents) rated “Very much satisfied” while the remaining 35.5% (11 respondents) chose “Yes, satisfied to some extent.” Most of the transportation companies and also passengers interviewed said they were very satisfied with the project.

(2) Convenience for motorcycles
For safety reasons, motorcycles are not allowed to use the Hai Van Pass Tunnel. However, HAMADECO, the tunnel operator, provides a regular transportation service for motorcycles. Trucks to carry motorcycles and buses to carry motorcycle drivers operate every 10-20 minutes at a very low tariff. In this way, motorcycles also benefit from the project.


Asking a driver to accept an interview


Service to carry motorcycles and their drivers

(3) Recognitions and awards received
Though this was the first tunnel construction project in Vietnam with the fruitful cooperation of Japanese and Vietnamese stakeholders at all levels, the Hai Van Pass Tunnel Project has been nationally and internationally recognized as a very successful project in many aspects. These include quality, environment and technology transfer to the Vietnamese technical team. The following awards have been granted to the project:

- One of the best 24 global projects by ACEC (The American Council of Engineering Companies)
- Environment Award by TDF America (Transport Development Fund of America)
- Best Quality Award by the Construction Management Association of America

Apart from these awards, the project was evaluated highly by the State Inspection and Taking-Over Committee in terms of quality.

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

3.4 Impact (Rating: a – as part of the effectiveness rating)

3.4.1 Intended Impacts

In the period 2000-2004, the GDP of Vietnam increased on average 7.17% p.a. After project completion, the GDP of Vietnam grew at a higher rate on average, at 7.8% p.a. (2005-2008) (IMF). Although there is no clear evidence for the contribution of the tunnel to economic growth, it has provided great support to the development of road transportation and trading, given the fact that the Hai Van Pass Tunnel eliminated the biggest bottleneck of National Highway No. 1, which is the main artery of the country. Also, the tunnel supported trade with neighboring countries with recently accelerating development through the East West Economic Corridor. From 2000 to 2004, the total import and export values at the Lao Bao cross border

gate were USD 201 million. After project completion, from 2005 to 2009, the total import and export value at the Lao Bao cross border gate increased to USD 737.5 million.

The socio-economic picture of Da Nang and Thua Thien Hue did change considerably as the result of the Hai Van Pass Tunnel. In the year 2000, there were 28 FDI companies in Da Nang with a total value of USD 33.5 million, while foreign direct investment (FDI) in Thua Thien Hue was USD 2.8 million. After project completion, in 2008, there were 46 FDI companies in Da Nang with a total value of USD 602 million. FDI in Thua Thien Hue increased to USD 1,096 million (GSO). This huge development of FDI, industrial parks and economic zones can be partly attributed to the Hai Van Pass Tunnel. For example, according to an interview with the management board of the Lang Co-Chan May Economic Zone and two companies investing in Da Nang and Thua Thien Hue, the companies considered local infrastructure and the transportation system as major criteria for choosing a place to base their companies or factories. They recognize that the Hai Van Pass Tunnel has improved the transportation network and made their business easier in both buying and selling goods and services. It was one of the factors that led them to chose Da Nang or Thua Thien Hue for investment.

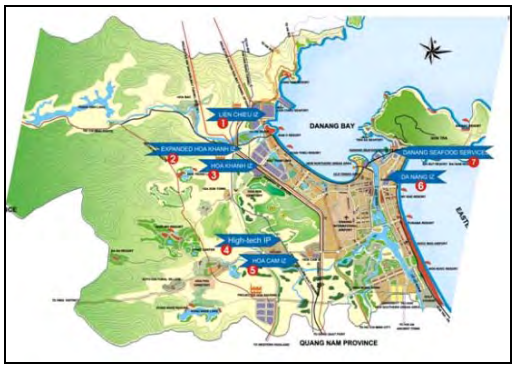


Figure 3: Da Nang Industrial Park

Figure 4: Lang Co-Chan May Economic Zone

All other beneficiaries interviewed: 8 transportation companies, 6 local residents and local authorities, also see the Hai Van Pass Tunnel as a factor which has contributed to central economic development.

Beneficiaries of the Hai Van Pass Tunnel not only include transportation companies but also all drivers and passengers who use the tunnel in daily life and for their businesses. Moreover, the communities that drivers and passengers belong to, as well as company customers, are also indirect beneficiaries. The number of the project beneficiaries can thus be said to be uncountable. At the very least, it can be said that the drivers and passengers of more than 1 million vehicles using the tunnel each year directly benefit from the project[13].

3.4.2 Other Impacts

(1) Management and technology transfer

Vietnam has learned technology for tunnel construction and O&M. Such technology was applied when the Ngang Pass Tunnel in Ha Tinh Province was constructed in 2003-2004.

Researchers and lecturers from different universities and institutions have also been invited to training sessions provided by the project and have learned about the technology. It is expected

[13] For reference, the populations of Da Nang City and Thua Thie Hue Province are 752 thousand and 1,120 thousand, respectively (2004).

that they will transfer the technology to others through classes and seminars.

(2) Reduction of loss of goods transferred through the project section
According to transportation companies interviewed, before project completion, they often faced the problem of loss of goods on the Hai Van Pass as their trucks went slowly and it was possible for thieves to break in and take goods. After project completion, traffic inside the tunnel is monitored by the control room of HAMADECO, and no such losses are possible.

(3) More opportunities for workers from other provinces to find jobs in Da Nang
After the project, workers and staff from Hue were able to find jobs in Da Nang due to the large improvement in access to the Da Nang side. Within an hour, workers in Lang Co-Thua Thien Hue can come to offices in the Lien Chieu Industrial Zone. This was impossible using the Hai Van Pass.

(4) Impact on the Natural Environment
Air quality inside the tunnel is continually monitored by the Control Center of the Hai Van Pass Tunnel, and the ventilation system is operated to maintain the quality level within the standard[14].

Table 5: CO and Visibility levels in the Hai Van Pass Tunnel

Year	CO (ppm)	Visibility (%)
2006	2.87	79
2007	2.02	84
2008	2.73	82.5
2009	5.08	81.5

Source: HAMADECO

HAMADECO does not measure air quality and noise level outside the tunnel (around the air exhaust outlets near the top of the hill), but the ex-post evaluation team observed clean air and a silent atmosphere in the area. The 6 local residents interviewed said that they had no complaints about the environmental impact of the Hai Van Pass Tunnel in terms of air, drainage water quality and noise.

Therefore, the project can be said to have no negative environmental impact.

(5) Impact of Land Acquisition and Resettlement
In the original plan made at appraisal, 32 households from the Lang Co Township were to be relocated to a resettlement site developed by the project. After the detailed design, the number of households to be evacuated was re-counted at 60 households. However, because the construction of the resettlement site was delayed, most of these found new land in other places and moved there by themselves with supporting allowances for life rehabilitation and house rental paid by the project. Also, many resettled people could not buy land at the resettlement site as land prices there were higher in 2003 when land was sold to the resettled people than the land prices of 2001-2002 on which their compensation was based. Thus, they sold their vouchers (rights to buy land in the resettlement site) to others and moved to other places where land was cheaper. Under such circumstances, the exact number of households that were actually moved to the resettlement site was not available. Currently, there are 17 households living in the resettlement site. However, some of these are not resettled people but the households who have bought land from resettled people.

[14] The standard for CO is below 11ppm and for visibility, above 45%.

At the time of the hand over of the project to the local authority, the resettlement site had sufficient water supply, electricity system and waste water system facilities. However, at present, there have been damages to the water supply facilities[15]. According to interviews with 6 resettled people, other facilities other than the water supply are also in a poor condition due to insufficient maintenance. Also, they said that some families who were farmers or had small businesses lost their jobs after they moved to the resettlement site, because they lost their farmland or because the new location was not as attractive to shop customers.


Resettlement area developed by the project

In 2005, an impact survey on people affected by the project was conducted[16]. The survey results revealed that a majority of relocated people (including those who moved themselves) suffered a lack of funds for the building of new houses and delays in the development of the resettlement site. This was despite the fact that the land acquisition process and compensation by Thua Thien Hue Province followed Vietnam's laws and regulations.

3.5 Sustainability (rating: a)

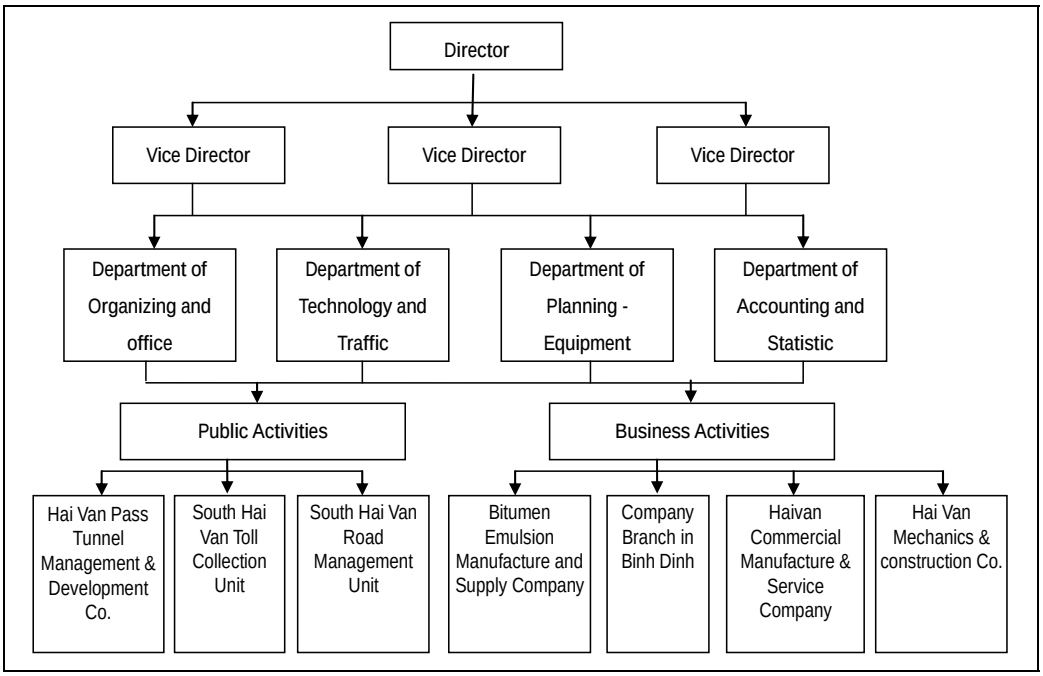
3.5.1 Structural Aspects of Operation and Maintenance

The state-owned Hai Van Pass Tunnel Management and Development Company (HAMADECO) is responsible for the operation and maintenance (O&M) of the Hai Van Pass Tunnel and its related facilities[17]. In accordance with the operation and maintenance plan at appraisal (i.e., to set up a Special Management Unit for the Tunnel), HAMADECO was established in 2005 by restructuring a state-owned road and bridge management and development company under the Regional Road Management Unit No.5 (RRMU 5) of the Vietnam Road Administration (VRA), Ministry of Transport (MOT). At the beginning, HAMADECO had an organizational structure that resembled a Japanese O&M system recommended by Japan, but later it changed its organization chart in a way that better fits a Vietnamese context. Currently, HAMADECO has 380 staff members. The Hai Van Pass Tunnel management and development company (HAPACO) has 189 staff members who are directly responsible for O&M of Hai Van Pass Tunnel.

[15] People interviewed and the local authority said that the construction works for Lang Co Bypass damaged the water supply facilities of the resettlement site. Under the Civil Contract, it was the contractor's responsibility to restore any damage caused by them during construction or to negotiate with the local authority (the property owner) for compensation. Agreement was reached between the local authority and the contractor without any further claims to the executing agency (PMU 85), and the contractor paid compensation to the local authority as agreed. Without water supply facilities, people dug wells to get water.

[16] Vietnam Academy of Social Sciences (2005), *Baseline Survey on Social Assessment: Hai Van Pass Tunnel Construction Project.*

[17] The operation responsibility of HAMADECO included toll collection until 2009, but then this was transferred to another state-owned toll collection company.



Source: HAMADECO

Figure 4: Organization Chart of HAMADECO

The other project outputs, namely, the approach roads, bridges and the bypass, are operated and maintained by RRMU 4 (Hue side) or RRMU 5 (Da Nang side) of VRA.

3.5.2 Technical Aspects of Operation and Maintenance

At HAMADECO, 120 staff are in charge of the operation and maintenance of the Hai Van Pass Tunnel. HAMADECO considers that the number and the capacity of their O&M staff is sufficient. This is due to well-advanced preparation of the organizational structure and training for O&M staff during project implementation.

During project implementation, a total 41 staff from the preceding company received major training (including overseas training) on aspects such as tunnel operation and emergency measures both from VRA and from the contractors. Other staff also received numerous other O&M-related training. At present, 90% of the trainees who had overseas training still remain at HAMADECO and provide training to new staff.

The O&M manual is well established and used. After a three-year operation of the tunnel, learning from PMU 85 and from abroad, HAMADECO revised the O&M manual themselves based on their experience, and this was approved by MOT. The manual is strictly followed by O&M staff, and their performance is inspected by RRMU 5.

The ex-post evaluation team observed that the tunnel is operated smoothly without technical problems. According to HAMADECO, there are neither accidents nor tunnel closures due to technical problems.

Control Room

New O&M Manual

3.5.3 Financial Aspects of Operation and Maintenance

All expenses for the O&M of the Hai Van Pass Tunnel are covered by the state budget on a request-basis. At appraisal of this project, the total O&M cost for the Tunnel was planned to be approximately USD 1.1 million, equivalent to 20 billion VND, annually. As shown in Table 6, the actual O&M budget is higher than planned[18]. The toll revenue from the Tunnel exceeds the O&M budget, and is even more than the total budget of HAMADECO (38 billion VND in 2007)[19].

Table 6: Toll collection and the O&M budget of the Hai Van Pass Tunnel

Unit: million VND

	Tolls collected	O&M budget allocated
2005	15,797	11,156
2006	40,749	29,622
2007	47,506	33,239
2008	50,107	45,282

Source: HAMADECO

3.5.4 Current Status of Operation and Maintenance

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project is high[20]. Maintenance of the tunnel and the facilities is regularly performed in accordance with the O&M manual. Although many spare parts are not produced any more or are very specialised (and thus have to be imported), consistency in replacement is mostly ensured. Currently, the purchase of additional equipment and spare parts totaling 12 billion VND is underway.

On the operation side, all vehicles as well as conditions inside the tunnel are carefully monitored and recorded by the Control Room, and necessary action (such changes in the

[18] A possible factor for the higher O&M cost than planned is the electricity cost, which accounts for almost half of the total O&M cost. However, the evaluation team could not identify the true reasons since information was not available on the breakdown of the planned O&M cost.

[19] Collected tolls are sent to the Treasury and then appropriated as O&M budget for national roads and bridges (including tunnels).

[20] There is damage on the surface of the north approach road, but repairs are planned.

settings of the ventilation system, the stopping of traffic offenders, etc.) is taken immediately. Two emergency rescue teams are ready at both entrances 24 hours a day. Also, the ex-post evaluation team observed that the tunnel was kept clean and had good visibility.

Conditions inside the tunnel

Rescue team standing by

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

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

4.2 Recommendations

4.2.1 Recommendations for the related agencies

1) It is recommended that HAMADECO maintain and further enhance its current good O&M practices of the tunnel.

2) It is recommended that the Executing Agency makes maximum use of the experience gained from this project for future tunnel construction projects by continuing to disseminate technology used by the project and through human exchange.

4.2.2 Recommendation for JICA

Not specifically.

4.3 Lessons Learned

(1) The resettlement area should be constructed in a convenient location and in a timely manner to secure the livelihood of people affected by the project.

Even if land acquisition plans follow the laws and regulations of Vietnam, there is a possibility that the people relocated are negatively affected. To avoid such a possibility, the following actions could be suggested based on experience from this project:

- That the executing agency work with the local authorities to find resettlement site locations that are convenient for affected people.
- That the executing agency give priority to completing the construction of the resettlement area before the removal of displaced persons.
- That the executing agency confirm, at the hand-over of the resettlement site, the local authorities' commitment to maintaining infrastructure and utilities.
- That PMU have good coordination and communication with the local authority in

order, as much as possible, to reduce the period between the valuation of land in the resettlement site and the selling of it, and be keen to improve the negative impacts of the project on the local area.

(2) A project that applies new technology should have advanced preparation for O&M during the construction period

As seen in detail in the sustainability section, O&M undertaken by HAMADECO has proved to be highly effective from the tunnel opening to the present, even though this was the first time that Vietnam had applied the new and advanced tunnel technology.

This success can be attributed to the well prepared plan for O&M which was prepared in advance, covering the construction phase with an initial set-up plan, a designed organization chart and with various kinds of training programs, including on-site training, local and oversea training. The well prepared plan and the close connection between the project owner and the user (O&M) in the implementation phase has contributed to the smooth operation and maintenance of the completed works.

Comparison of Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs 1) Construction of tunnels and related facilities	Main tunnel (6,274m long, 2 lanes) and Evacuation tunnel, electric works, mechanical works	Mostly same as planned
2) Construction of approach roads and bridges	2-lane roadway (4,704m), Lang Co Bridge (876m long), 6 other bridges	Mostly same as planned
3) Construction of resettlement area	Infrastructure	Same as planned
4) Consulting services	Special Survey for route selection, detailed design, tender assistance, environmental monitoring	TOR same as planned Foreign 479.27 MM Local 1,311 MM Additional works: Lang Co Bypass (10,936m)
2. Project Period	March 1997-November 2003 (81 months)	March 1997-June 2005 (100 months)
3. Project Cost Amount paid in Foreign Currency	19,494 Million Yen	12,803 Million Yen
Amount paid in Local Currency	18,487 Million Yen (1,849 Billion VND)	4,669 Million Yen (259 Billion VND)
Total	37,981 Million Yen	17,472 Million Yen
Japanese ODA Loan Portion	31,824 Million Yen	15,315 Million Yen
Exchange Rate	1 VND= 0.01Yen (As of October 1998)	1 VND = 0.0083Yen (Average during period from 1996 to 2009)