

Viet Nam

Ex-Post Evaluation of Japanese ODA Loan Project

Hanoi Urban Infrastructure Development Project

(Phase I: Public Sector Support to Thang Long North Area)

External Evaluator: Noriyo Aoki, IC Net Limited

0. Summary

The project aims to promote industrial and regional development by infrastructure improvement. The evaluation shows the project's high relevance to Viet Nam's development policy and needs as well as the Japanese government's development aid policy. The project facilities in general are effectively used, leading to such impacts as creating jobs and meeting the demand for infrastructure of the people in the vicinity.

Although the project has been relatively inefficient as its duration has been prolonged, it faces no serious problem in the current operation and management system, and is expected to be managed appropriately in the future.

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

1. Project Description



Project Location



Road in front of Thang Long Industrial Park

1.1 Background

Viet Nam has achieved a favorable economic growth since the Doi Moi reform and the policy of socialist-oriented market economy were adopted. On the other hand, Hanoi, the capital, began to suffer from such negative aspects of the rapid economic growth as serious congestion in residential and industrial areas due to a population increase and heavy traffic jam on the roads. The Hanoi People's Committee formulated the Hanoi City Urban Development Plan in 1996 to address such negative effects and promote industrialization, while aiming to develop the suburbs

of Hanoi in a systematic and comprehensive fashion. As part of such undertaking, Hanoi City made a plan to thoroughly develop the Thang Long North Area. Since a private developer had already decided to invest in the Thang Long Industrial Park based on Master Plan of Industrial Development in the Hanoi Area by the Development Study, it was decided to conduct a public infrastructure development project.

1.2 Project Outline

The objective of this project is to secure fundamental infrastructure for industrial park and housing development in the Thang Long North Area by constructing basic facilities such as roads, water supply, sewage, waste water treatment, and power supply as Hanoi Urban Infrastructure Development Project (Phase I: Public Sector Support to Thang Long North Area), thereby contributing to increase of industrial production, expansion of employment, increase of export, acquisition of foreign currency, and reducing the congestion in the central part of Hanoi City.

Loan Approved Amount / Disbursed Amount	11,433 million yen / 10,591 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	January 1997 / March 1997
Terms and Conditions	<ul style="list-style-type: none"> • Interest Rate for Roads, Sewage, Power Supply: 2.3% (Interest Rate for Water Supply and Waste Water Treatment: 2.1%) • Repayment Period: 30 years (Grace Period: 10 years) • Conditions for Procurement: General Untied
Borrower / Executing Agency	The Government of the Socialist Republic of Viet Nam/Hanoi People's Committee
Final Disbursement Date	January 5, 2009
Main Contractor (Over 1 billion yen)	Taisei Corporation (Japan), Ebara Corporation (Japan) , Sumitomo Mitsui Construction Co., Ltd. (JV)
Main Consultant (Over 100 million yen)	Nippon Koei Co., Ltd. (Japan)
Feasibility Studies, etc.	Development Study "Master Plan of Industrial Development in the Hanoi Area "
Related projects (if any)	Overseas Investment Loan " Industrial Park Construction Project in Viet Nam"

2. Outline of the Evaluation Study

2.1 External Evaluator

Noriyo Aoki, IC Net Limited

2.2 Duration of Evaluation Study

Duration of the Study: December 2010 – November 2011

Duration of the Field Study: April 1 - 15, 2011; June 1 - 7, 2011

2.3 Constraints during the Evaluation Study

At the time of the project appraisal, not only the industrial estate but also a large distribution center, commercial complex and residential complex for foreigners were to be covered by the infrastructure services of the project. For a while, the F/S was formulated to change infrastructure development in order to improve the local people's residential area as well as the industrial estate. Then the revised F/S was adopted by the Prime Minister's Office and implemented for infrastructure development.

Since comparison between the revised F/S and the actual achievement would result in the most accurate evaluation, a comparison between the value in appraisal documents/the revised F/S and the actual achievement was done to analyze the project cost. However, it was difficult to do the same on the project duration due to the limited information on the revised F/S. The comparison between the revised F/S and the actual achievement was primarily used for the evaluation of the effectiveness. Since the description of the planned and target values in the appraisal documents was insufficient, the data on the use of facilities and the satisfaction of their users were also used for the purpose of reference.

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

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan of Viet Nam

(1) Development of Plan at Appraisal

The Government of Viet Nam adopted the "Socio-Economic Stabilization and Development Strategy to the Year 1991-2000," which aimed to double income in the next decade, increase investments in infrastructure, gain high efficiency by creating a conducive employment environment, and promote foreign direct investment. Following this development policy, the plan of the project was made based on the "Master Plan of Industrial Development in the Hanoi Area" which was formulated by JICA and the Hanoi People's Committee.

Hanoi City proposed to disperse the growth poles in the vicinity of the central Hanoi in the "Hanoi City Urban Development Plan" in 1996 and the "Hanoi City New Urban Development Plan" in 1998.

The project is relevant to the socio-economic development plan, industrialization plan and urban planning of the Government of Viet Nam.

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

² ③: High; ② Fair; ① Low

(2) Development Policy at Ex-Post Evaluation

The Government of Viet Nam aims to promote industrialization, development of an export-oriented industry, and introduction of foreign investment, expecting that rapid industry development would be brought by expansion of both the international and domestic markets as stated in the “Five-Year Socio-Economic Development Plan (2006-2010)”. Furthermore, the “Hanoi Industrial Development Master Plan by 2030 with a vision for 2050”³ contains a plan to develop industrial estates in Dong Anh District. The “Master Plan for Hanoi Comprehensive Development by 2030 with vision to 2050” has a plan to develop the Thang Long North Area as an industrial area of high technology and improve livelihood-related infrastructure, such as water supply, waste water treatment, and electric supply for the vicinity of the industrial estate.

Even at the time of the ex-post evaluation, the project has remained significant for industrial development and improving people’s livelihoods. The project is consistent with the Vietnamese government’s socio-economic strategy, industrialization plan, and city planning.

Therefore, the relevance of the project is high at the time of the appraisal as well as the ex-post evaluation.



Source: Map of Thang Long Industrial Park

3.1.2 Relevance with the Development Needs

3.1.2.1 Needs of Investment Environment

The Thang Long North Area, located 14 km from the Noi Bai International Airport and 16 km from central Hanoi, is able to avoid the congestion. It has favorable site conditions to ensure efficient distribution with a high investment value.

The environment for foreign direct investment in Hanoi and Northern Viet Nam has improved by the development of laws on investment, needs for risk hedge against investments in China, and future possibilities to export products to China.

From the viewpoint of international trade balance, Viet Nam has been suffering from the excessive amount of import since the time of the appraisal. Export-oriented industrial production has been required to address the serious trade imbalance.

³ Although it was under discussion in the parliament as of April 2011, it was approved by the Prime Minister (Decision Ref1259/QD-TTg) in July.

3.1.2.2 Needs of Infrastructure Development in Suburban Area

The regional development of the residential area around the Thang Long Industrial Park has been promoted. Therefore, the importance of water supply, roads, and electricity supply as basic infrastructure is high even at present. In accordance with the demand of the infrastructure in the rapidly developing suburbs, the project has revised the scope of work in a flexible manner and proceeded to meet the needs accordingly.

3.1.3 Relevance with Japan's ODA Policy

Japan made the Country Assistance Policy for Viet Nam (1994-1999) at the time of the appraisal. The policy set one of the priorities in the assistance to Viet Nam as the promotion of foreign investment for an export-oriented economic growth. The policy also emphasized the assistance for a market-oriented economy. With regard to yen loan projects, the policy placed importance on cooperation to the electricity, transport and environment areas. As the project includes the electricity, road, sewage and waste water management components, it is consistent with the policy.

The project has been highly relevant to Viet Nam's development plan, development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The revised F/S changed the original scope of work. The major outputs and the points that were changed are summarized below.

1. Road: The major outputs are a road in front of the industrial park and one leading to the housing area in the eastern part of the highway. The interchange that had been originally planned was changed to an overpass because motorbike and pedestrian traffic needed to pass the road. This improved traffic under the overpass.
2. Water Supply: The original planned capacity of the water purification plant at 60,000 m³/day was changed to 51,360 m³/day due to a low projected demand at the time of the revised F/S. The major reason is that the initially planned large-scale facilities to serve as a growth pole were not expected to be built.
3. Waste Water Treatment: The demand forecasting was below the planned capacity of 66,000 m³/day at the appraisal, and the capacity was reduced to 38,000 m³/day because the large-scale facilities were not expected to be built.
4. Sewage: The major outputs are a pumping station and sewage canals. The flood adjustment pond was added to the new plan to control floods in the area. This is considered to be a proper change of scope which reflects the local needs.

5. Electricity: The original plan was to build two (110 kV/22 kV) 80-MW power transmission stations. However, the project built only one for residences and waste water treatment plant because the industrial park's developer constructed a power transmission station inside the park at its own expense.

As stated above, the original plan was properly revised based on accurately projected demand. The final outputs were completed in line with the revisions, contributing to the achievement of the Project Purpose. After the project's completion, Hanoi City took over the construction of the part of the road in the eastern part of the highway and flood control ponds, both of which were delayed due to land acquisition, and is continuing the work with its own budget.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned cost at the appraisal was 13,463 million yen in total (7,547 million yen in foreign currency, 5,916 million yen in domestic currency).⁴ Of the planned total cost, 11,433 million yen was a Yen Loan.⁵

The actual cost was a total of 14,283 million yen (7,377 million yen in foreign currency, 6,906 million yen in domestic currency⁶), of which the Yen Loan accounted for 10,591 million yen. This was 106.1% of the cost at the initial appraisal. The cost in the revised F/S was 16,625 million yen.⁷

Since new construction work was added to the revised F/S, the cost of the land acquisition increased so that the planned cost was higher than the cost at appraisal. The actual cost was lower than the revised cost (85.9% of the planned cost).

Table 1: Comparison between Planned and Actual Costs (Unit: Million Yen)

Items	At appraisal			Revised F/S ⁸	Ex-post evaluation		
	Foreign	Domestic	Total	Total	Foreign	Domestic	Total
Road	453	2,161	2,614	2,205	1,227	1,180	2,407
Water Supply	1,764	479	2,243	2,411	1,716	465	2,181
Sewage	679	773	1,452	1,882	1,424	598	2,022
Waste Water	2,341	631	2,972	2,770	1,232	480	1,712
Electric Supply	1,053	60	1,113	790	259	100	359
Land Acquisition	0	286	286	1,128	0	2,794	2794
Price Escalation	257	173	430	860	-	-	-
Contingency	503	351	854	2,203	-	291	291
Consulting Service	496	361	857	1,375	1,519	391	1,910

⁴ Exchange rate in the appraisal document: 1 yen = 100.2 VND

⁵ The project cost in the appraisal document

⁶ Exchange rate: 1 yen = 132.89 VND, based on the simple average during the payment period

⁷ Exchange rate: 1 yen = 116.13 VND, based on the simple average rate of all the months of 2002

⁸ Only the total cost was described in the revised F/S, which was not segregated by foreign and domestic currency.

	At appraisal			Revised F/S ⁸	Ex-post evaluation		
Taxes and Administrative Costs	0	641	641	1,001	0	607	607
Total	7,547	5,916	13,463	16,625	7,377	6,906	14,283

While the actual cost exceeded the planned cost at the appraisal, it is lower than the revised budget (Sub-rating: ③).

3.2.2.2 Project Period

The project required 147 months as opposed to the planned 42 months. Thus the actual project period was 286% of the original plan (Sub-rating: ①).

One of the reasons for the prolonged duration was that the revised F/S was implemented in accordance with the new regional development plan. Before the detailed plan began, it took six months to select a consulting firm to formulate the F/S and revise the original plan. In the detailed plan, approval from Hanoi City or relevant government departments was required to ensure compliance with regulations and standards, which took considerable time. Therefore, it took 37 months instead of the 13 months estimated at the appraisal. Furthermore, since Hanoi City and the consulting firm used different cost calculation methods when bids were prepared, it was time-consuming to prepare estimates. Moreover, estimates had to be adjusted whenever the cost of materials soared drastically.⁹ As Table 2 shows, this meant that the bidding process and selection of construction firms took a great deal of time, requiring 54 months rather than the seven months estimated in the plan. In addition to delays in the construction itself, the prolonged land acquisition influenced the progress of construction. Initially, the land acquisition had been planned to take 15 months. However, it actually took 120 months from December 1998 to December 2008.

Table 2: Comparison between the Planned and Actual Project Period

	Original	Month	Actual	Month
L/A	Feb. 1997		March 1997	
Contract with Consulting Firm	July 1997		Aug. 1999	
Detailed Design				
Road	Nov. 1997 - Nov. 1998	13	Oct. 2000 - Nov. 2003 ¹⁰	37
Water Supply	Dec. 1997 - Sep. 1998	10	Oct. 2000 - Jan. 2002	16
Waste Water Treatment	Jan. 1998 - Oct. 1998	10	Oct. 2000 - Nov. 2003	37
Sewage	Jan. 1998 - Oct. 1998	10	Oct. 2000 - Nov. 2003	37
Electricity	Jan. 1998 - Sep. 1998	9	Oct. 2000 - Oct. 2002	25
Selection of Construction Firms	Nov. 1998 - May 1999	7		54
Road	-	-	Apr. 2002 - Sep. 2005	40
Water Supply	-	-	Apr. 2001 - Mar. 2002	12
Waste Water Treatment	-	-	Apr. 2001 - Jul. 2002	16

⁹ The content of F/S, Detailed Design and other documents must be approved by an unanimous decision of the People's Committee.

¹⁰ Since the road and sewage facility were treated as one package, the period of construction for both was the same.

	Original	Month	Actual	Month
Sewage	-	-	Apr. 2002 - Sep. 2005	40
Electricity	-	-	Apr. 2002 - Nov. 2003	18
Land Acquisition	May 1996 - Jul. 1997	15	Dec. 1998 - Nov. 2008	120
Bidding and Construction Period	Jun. 1999 - Jul. 2000	14		
Road	-		Nov. 2005 - Jan. 2009	39
Water Supply	-		April. 2002 – Sep. 2004	30
Waste Water Treatment	-		Sep. 2003 - Sep. 2005	25
Sewage	-		Nov. 2005 - Jan. 2009	39
Electricity	-		Dec. 2003 – Sep. 2005	22
Completion	July 2000		May 2009	
Project Period	42 Month		147 Month	

Source: Appraisal document and information provided by the implementing agency.

As stated above, while the project costs were within the plan, the project period was considerably longer than planned. Therefore, the efficiency of the project is fair.

3.3 Effectiveness (Rating: ②)

Effectiveness has been comprehensively evaluated in terms of the operating rate and facility use, taking into account the users' satisfaction with the facility. The users of the facilities are divided into two types: industrial park and surrounding residents.

First, 3.3.1 examines the operational situation and the extent to which the effect was realized at each of the facilities both qualitatively and quantitatively. Second, 3.3.2 describes as a general statement the outcome at the higher level in the industrial park and surrounding residential area.

Table 3-1 summarizes the evaluation results in accordance with the operating rate and use rate.

Table 3-1: Evaluation in Accordance with Operating Rate and Use of Facility

Facility	Indicator	Planned Value	Achievement Value	Three-Point Scale*
Road	Annual Average Daily Traffic	27,840	58,751	3
Water Supply	Amount of Water Supply (m ³ /day)	51,360	29,662	2
Waste Water Treatment ¹¹	Waste Water Treatment (m ³ /day)	38,000	6,295	1
Electricity	Amount of Transmission	N/A ¹²	N/A ¹³	-
Sewage	Difficult to set indicator ¹⁴	N/A ¹⁵	N/A ¹⁶	-

*Here are the ratings according to the JICA Yen Loan Evaluation Training Textbook: 3: more than 80% of the planned value; 2: less than 80% and more than 50% of the planned value; and 1: less than 50% of the planned value.

¹¹ In relation to waste water treatment management, the revised F/S did not clearly refer to the housing area as a target beneficiary. The revised F/S targeted the industrial estate and included other future demand.

¹² There is no description in the appraisal document and the revised F/S.

¹³ Despite the availability of the annual amount of electrical transmission, it is difficult to judge the extent of operation from it. The reason is that an operation of electrical transmissions depends on external factors such as the operation of electric power station and composition of transmission networks.

¹⁴ The pressure pumping stations have been set up to prevent flood in case of increase in rainfall. It is difficult to set an indicator because the frequency of use rests on this need.

¹⁵ There is no description in the appraisal document and the revised F/S.

¹⁶ In accordance with the footnote 14, it is difficult to set the actual value.

Table 3-2 summarizes the facilities' ratio of use and user satisfaction.

Table 3-2: Evaluation of User Satisfaction based on Ratio of Facility Use¹⁷

Facility	Ratio of Use		User Satisfaction		User Satisfaction based on the Weighted Average of Ratio of Use
	Industrial Park	Surrounding Area	Industrial Park	Surrounding Area	
Road	5	5	3	3	3
Water Supply	4	6	3	2.5	2.7
Waste Water Treatment	10	0	1	N/A	1
Electricity	1 ¹⁸	9	1	2	1.9
Sewage	2	8	3	3	3

< Rating Methods >

- Evaluate the sub-rating on the basis of a three-point scale according to the user's satisfaction.
 - High (The users' needs are fully met both qualitatively and quantitatively.)
 - Fair (The users' needs are fairly met both qualitatively and quantitatively.)
 - Low (The users' needs are not fully met either qualitatively or quantitatively.)
- Calculate the user's satisfaction by the weighted average based on the user's ratio.

Table 3-3 shows the final evaluation as the result of the ratings above.

Table 3-3: User Satisfaction based on the Ratio of Use

Facility	Evaluation in accordance with Operation Rate and Use of Facility*	Evaluation by User Satisfaction **	Final Evaluation***
Road	3	3	3
Water Supply	2	2.7	2.2
Waste Water Treatment	1	1	1
Electricity	N/A	1.9	1.9
Sewage	N/A	3	3
Average	-	2.3	2.2

* The rating in accordance with the operation rate and use of facility in Table 3-1.

** The rating following evaluation by user satisfaction based on the ratio of facility use in Table 3-2.

*** The rating by weighted average of the two left-hand columns.

Therefore, the rating of effectiveness is judged as ②, i.e., fair.

3.3.1 Operation and Effect of Facilities

(1) Road

Table 4 shows that the actual amount of traffic on the highway overpass exceeded the planned value. Thus the roads that were built in the project are effectively utilized.¹⁹

¹⁷ The ratio of facility use was calculated based on the operating situation and the interviews conducted in the study.

¹⁸ Before the project, the developer of the industrial estate built the power transmission station at its own expense and continued to use it. The waste water treatment plant uses the electricity generated by the power station that the project built for the plant's operations.

¹⁹ There was no planned value in the revised F/S. Since the scope of work was not changed much, the value at the appraisal was used.

Table 4: Annual Average Daily Traffic on Highway Overpass

(Unit: Number of vehicles)

	Value at Appraisal	Actual in 2008
Annual Average Daily Traffic	27,840	58,751
(Breakdown)		
Automobile	1,530	7,894
Motorbike	22,900	36,172
Truck	2,860	6,152
Bus	550	8,533

Source: Documents of Appraisal and Results of the Study

【Industrial Park】

The improved road in front of the industrial park and the road leading to the highway earned a good reputation owing to the convenience for the traffic of truck and large-scale containers (Fig. 2). People in the vicinity and employees of the industrial estate can safely cross the road under the highway overpass (Fig. 1). 64.3% of the firms in the industrial park rated the road improvement as “Satisfactory” and 35.7% as “Partly Satisfactory”²⁰.

【Surrounding Residential Area】

Similarly, 89% of the residents in the vicinity responded that “Without the overpass, traffic accidents would frequently occur.”²¹ The roads provide easy access from the vicinity to the highway and are effectively utilized.

The roads built by the project in the residential area in the eastern part of the highway lead to other areas, which helps to improve the quality of life in the vicinity. 89% of the respondents stated that the roads built by the project were “Very Satisfactory” and 11% “More or Less Useful.”²²



Fig.1: Highway Overpass and Cross Road



Fig. 2: Road in Front of Thang Long Industrial Park

²⁰ Results of the beneficiary survey given to firms in the industrial estate. The survey had four ratings: “Satisfactory,” “Partially Satisfactory,” “Less Satisfactory” and “Very Unsatisfactory.”

²¹ Results of the survey given to residents in the vicinity.

²² Results of the beneficiary survey given to the residents. The beneficiary survey given to residents in the vicinity had three ratings: “Satisfactory,” “Not Satisfactory” and “I do not know.” Respondents in the questionnaire were asked to rate the roads as “Very Useful,” “Partly Useful,” or “Not Useful At All.”

(2) Water Supply

The water purification plant has been operating without any trouble. As Table 5 shows, the amount of the water supply has been increasing. The reason for the increase is that the water supply to the central part of Hanoi City across the Red River has been expanded, in addition to the supply to the area surrounding Thang Long. Since the intake of water from the borehole decreased year by year²³, Hanoi City increases the number of boreholes to solve the issues. Although the revised F/S was modified to reduce the capacity, Table 6 shows that the operation rate is still 57.6%. To increase the operation rate, Hanoi City plans to supply water to the city area across the Red River.

As Table 5 shows, the leakage rate increased to 0.56% in 2009 and 1.3% in 2010. Since a leakage rate less than 5% complies with the standards of Hanoi City, it does not pose a problem in terms of operation and maintenance.

Table 5: Water Supply Indicators

	2005	2006	2007	2008	2009	2010
Amount of Water (m ³ /year)	167,414	1,717,867	6,867,576	7,725,226	7,364,795	10,826,583
Leakage Rate (%)*	0	0	0	0	0.56	1.3
Water Quality	Complying with Viet Nam Water Quality Standard ²⁴					

Source: Information from Hanoi Water Works, April 2011

Table 6: Comparison between the Planned and Actual Water Supply Indicator

	Plan of Revised F/S	Actual ²⁵	Operation Rate
Amount of Water (m ³ /Year)	51,360	29,662	57.6%

Source: Information from Hanoi Water Works, April 2011

【Industrial Park】

The water supply plant is able to supply up to 17,000 m³/day for the industrial estate. Out of the companies in the industrial park, 78.6% replied that it was “Satisfactory” and 21.4% “Partly Satisfactory.”²⁶

²³ Results of the interview of an O&M organization at a water purification plant (April 2011).

²⁴ Turbidity 0.28 (standard value <2), pH 7.8 (standard value 6.5-8.5), Ammonia 0 mg/l (standard value <3mg/l), Nitrite compound 0 mg/l (standard value <3 mg/l), chlorite 19.88 mg/l (standard value <250 mg/l), hardness 138 mg/l (standard value<300 mg/l), magnesium 0.187 mg/l (standard value <0.3 mg/l), Iron 0.01 (standard value<0.3 mg/l). The water quality after purification in July 2011 was from the Hanoi Water Works.

²⁵ This was the actual value in 2010.

²⁶ Results of the Beneficiary Survey given to companies in the industrial estate



Fig. 3: Water Purification Plant



Fig. 4: Water Tank

【Surrounding Residential Area】

Up to 20,000 m³/day of water is supplied to the vicinity.²⁷ In addition to 16,000 households in Thang Long, 15,000 households in the districts across the Red River are covered. A total of 54,000 people get benefit. The result of the Beneficiary Survey shows that 54% responded “Satisfactory” and 46% “Not Satisfactory”. Among the reasons are periodical turbidity²⁸ and water outage.²⁹ (These reasons may be related to the state of electricity in Hanoi City and the prolonged water outage due to the shortage of underground water.)

(3) Waste Water Treatment Plant

The amount of waste water treatment and BOD₅³⁰ were adopted as the indicators for the operation of the waste water treatment plant. Table 7 shows those indicators. BOD₅ (mg/l) is less than 30 (mg/l) of the Hanoi City Sewage Standards. Table 8 indicates that the amount of waste treatment water is lower than the plan.

Table 7: Indicators for the Waste Water Treatment Plant

	2008	2009	2010
Amount of Waste Water Treatment /Year (m ³)	307,388	1,220,181	1,888,505
BOD ₅ (mg/l)	12	11.5	8.5

Source: Hanoi Sewage and Drainage State Owned Limited Company, April 2011

²⁷ Results of interviews conducted with O&M organization in April 2011

²⁸ Hanoi Water Works has concluded that the turbidity often occurs during weekends, which is when the industrial park does not use water, because of the water pressure of the distribution system.

²⁹ Results of the Beneficiary Survey to the residents

³⁰ BOD stands for Biochemical Oxygen Demand. It is an indicator of water pollution and particularly important for measuring the quality of industrial sewage. BOD is the amount of oxygen that microbes consume when they dissolve organic matters in water. The larger the BOD, the dirtier the water. BOD₅ is the amount of oxygen consumed when microbes are cultivated in water at 20°C for five days.

Table 8: Comparison of Planned and Actual Indicators for Waste Water Treatment Plant

	Plan in Revised F/S	Actual at Ex-post Evaluation	Operating Rate
Amount of Waste Water Treatment /day (m ³)	38,000	6,295 ³¹	16.6%

Source: Hanoi Sewage and Drainage State Owned Limited Company, April 2011

【Industrial Park】

Although the construction of the waste treatment facility was completed in September 2005, it took two years to complete the construction of sewage pipeline between the industrial park and the waste water treatment plant, which should have been done by Hanoi City. The facility began actual operation in 2008. The developer of the industrial park and the companies that entered the park have used the waste water treatment facility built by the developer. At present, they use their own plant as well as the project's plant. Therefore, the operating rate is only 16.6%. However, in the Beneficiary Survey, 78.6% of the companies of the industrial park replied that operations were "Satisfactory" and 21.4% that they were "More or Less Satisfactory"³².

【Surrounding Residential Area】

In the residential area, households are left to conduct their own sewage treatment. A natural filtration drainage system is used for the sewage of the surrounding residential area. As of 2011, Hanoi City does not have a budget to construct a drainpipe for the residential area. Despite the needs of the area, the residents are unable to use the waste water treatment facility.³³

(4) Electricity

As shown in the indicators in Table 9, the power transmission station has been appropriately operating, and power outages have been brief.

Table 9: Indicators for Power Transmission Station

	2006	2007	2008	2009	2010
Amount of Power Transmission (MWh/Year)	-	-	90,804	90,696	129,955
Time of Power Outage (Time/Year)	15.2	16	16	17	15
Voltage Drop at Peak Hour	+/-5%	+/-5%	+/-5%	+/-5%	+/-5%

Source: Hanoi EVN April and July, 2011

【Industrial Park】

Before the project started, the developer had constructed a power transmission station at its own cost for building the industrial park and preparing for companies that were to operate in the

³¹ The total annual amount of waste water treatment divided by the number of working days of factories except Sundays and holidays

³² Results of the Beneficiary Survey given to companies in the industrial estate. There were four ratings: "Satisfactory," "Partially Satisfactory," "Less Satisfactory," and "Very Unsatisfactory."

³³ The sewerage pipeline has connected southern Hanoi City to the Red River since 2011 to prevent natural filtration of household waste. This waste water is discharged into the Red River. The project's waste water treatment plant does not treat household waste. In the future, Hanoi City will have a plan for this matter.

park. The developer still uses the station.³⁴ This has occurred because the developer's construction of the power transmission station proceeded faster than the land acquisition and approval in the project, which took much longer than planned. As stated in "3.2 Efficiency," in the revised F/S, the power transmission station for the industrial park planned at the time of appraisal was deleted, and only the one for people's livelihoods remained. Thus the companies that entered the industrial park do not use the project's power transmission station while the waste water treatment plant does.³⁵

【Surrounding Residential Area】

The power transmission station built in the project covers one-third of the population of Dong Anh district, or 0.1 million people³⁶. According to the Beneficiary Survey, 36.4% of the respondents believe that it is "Satisfactory" and 63.6% "Not Satisfactory"³⁷. The reasons for the dissatisfaction include unplanned power outages, dropdown of voltage and others. The unplanned power outage is due to problems with the electricity supply in Hanoi City overall and is not directly related to the project.³⁸ This was taken into consideration when judging the effectiveness.

(5) Sewage

The sewage canal from the industrial park to the surrounding residential area and the ponds for flood control³⁹ are operated properly to discharge the water and contribute to prevention of floods when rainfall increases. They function without any problems.

【Industrial Park】

Out of the companies in the industrial park, 71.4% rate the sewage and rain water drainage as "Satisfactory" and 28.6% "Partly Satisfactory"⁴⁰.

【Surrounding Residential Area】

76.2% of the people in the surrounding residential area were satisfied with the sewage and flood control adjustment pond and 23.8% were partly satisfied. This shows that the sewage and rain water systems have a good reputation in the vicinity.⁴¹

³⁴ The power transmission station belongs to Hanoi EVN, which also implements O&M of the facility.

³⁵ 1,238 MWh/year was used in 2010.

³⁶ Results of interviews with Hanoi EVN (April 2011).

³⁷ Results of the Beneficiary Survey given to the residents. The Beneficiary Survey given to the residents in the vicinity was conducted with three ratings for evaluation: "Satisfactory," "Not Satisfactory," and "I do not know."

³⁸ Results of the questionnaire survey to the residents as Beneficiary Survey

³⁹ The sewage canal and flood adjustment pond were completed within the period. They refer to the sewage canal connecting the industrial park and the surrounding residential area and flood control pond located near the residential area of the vicinity.

⁴⁰ Results of the Beneficiary Survey given to the companies in the industrial estate. The evaluation was based on four ratings: "Satisfactory," "Partially Satisfactory," "Less Satisfactory," and "Very Unsatisfactory."

⁴¹ Results of the Beneficiary Survey given to the residents. The evaluation in relation to the sewage and flood control was based on four ratings: "Satisfactory," "Partly Satisfactory," "Partly Unsatisfactory," and "Very Unsatisfactory."

3.3.2 Outcome at Higher Level

Since the developer developed the industrial estate, it was in charge of sales and inviting companies to the estate. As a result, the project's contribution to the outcome at a higher level is indirect and limited. However, the basic infrastructure development of the project to spur private investment has contributed to various achievements of the companies that entered industrial estates. Below is a description of the state of the outcome.

(1) Industrial Park

Out of the total capital of US\$290 million for the 274-ha industrial park, the developer, a Japanese firm, invested 58%, and a Viet Nam state-owned company 42%. The construction period was divided into three phases. All the plots for all the construction phases were sold out in 2008. The project proceeded while companies were buying plots in the park and preparing to start operating their factories.

Table 10: Construction Period for Industrial Park by Developer

	Area of Industrial Estate	Construction Period	Sold-Out Period
First Phase	121 ha	July 1998 –July 2000	2007
Second Phase	74 ha	March 2003 -December 2004	2008
Third Phase	79 ha	January 2006-September 2007	2008

Source: Information of the Developers

Table 11: Achievement of Company Entry into Thang Long Industrial Park

	December 2006	December 2010
Number of Entry Companies ⁴²	63	88
Japanese Companies	57	82

Source: Information of the Developers (Figures for each year were not available)

The companies' reasons for entering the Thang Long Industrial Park included the following: good geographical location; good access to the Noi Bai Airport as well as the surrounding roads; tax privileges for the companies in the industrial park by the Vietnamese government; and services and reputation of the developer. 14.3% of the companies in the industrial estate replied that one of the reasons for entry was public infrastructure development.⁴³ The interviews with the developer also revealed that public support in the form of infrastructure development gave a sense of security to companies that invested in Viet Nam for the first time.⁴⁴

⁴² "Entry company" refers to the start of operations in the case of factories and the start of business in the case of offices.

⁴³ Results of the Beneficiary Survey given to companies in the industrial estate (Multiple answers were possible) (April 2011)

⁴⁴ Results of interviews with the developer (April 2011)

(2) Surrounding Residential Area

At the appraisal, there was a plan to develop large-scale commercial facilities and a housing complex. However, only the housing complex for workers was built by Hanoi City.⁴⁵ People from the outside moved in and built houses in the vicinity. The influx of people into the area has accelerated partly due to infrastructure development. According to the Dong Anh District Office, the population of the Thang Long North Area, which consists of six communes, has quadrupled in the last decade.

3.3.3 Results of Calculations of Internal Rate of Return (IRR)

The Economic Internal Rate of Return (EIRR) is basically calculated in the same way as the one at the time of the appraisal. It was recalculated by replacing the projected construction cost and benefits with the actual value.

Here are the items used for calculation.

- 1) Expenditure Cost: Construction costs of the Thang Long Industrial Park and the project cost, factory construction cost and operation costs of the Thang Long Industrial Park, loss of agriculture products in the developed area.
- 2) Benefit Cost: Value-added industrial production in the Thang Long Industrial Park.
- 3) Project Life: 20 years

EIRR was 16.44% at the appraisal and 37.04% at the ex-post evaluation.

The EIRR calculation at the appraisal was an economic analysis mainly targeting the industrial estate. Since the revised F/S includes the water supply and electricity supply for the vicinity, there are limits to the accuracy of any variation analysis when using the calculation method at the appraisal. However, to ensure consistency in the premises behind the comparison, EIRR was recalculated based on the method used with the appraisal. The cost items were the same as the planned ones. On the other hand, the benefits increased largely because the developer invited mainly export-oriented companies that produced high value-added industrial products, and the total added value of industrial products was much more than the planned one. Consequently, the EIRR turned out to be more than double the planned value.

The Financial Internal Rate of Return (FIRR) was not calculated because the project included development of such public infrastructure items as roads, which do not generate income.

In light of the above, this project has been effective to a certain extent. Therefore its effectiveness is fair.

3.4 Impact

3.4.1 Current Situation of Impact

⁴⁵ Results of interviews with the Hanoi People's Committee (April 2011)

(1) Impact that has been brought by basic infrastructure development for industrial estate

The project's contribution to the impact is more indirect than the one to the outcome. The current situation of the impact is described below according to the items that were expected at the appraisal.

1) Increase of industrial production and export, and acquisition of foreign currency

As of December 2010, out of the 88 enterprises in the Thang Long Industrial Park, 80, or 90%, are export-oriented.⁴⁶ The total annual export amount of the 88 enterprises is US\$2.3 billion in 2010, which amounts to 3.2% of the total export of Viet Nam. The total investment amount by the enterprises in the Thang Long Industrial Park is US\$1.58 billion in 2010.

Table 12: Indicators on Thang Long Industrial Park

	2006	2010
Number of Enterprises	63	88
Number of Export-Oriented Enterprises	58	80
Total Investment Amount by Enterprises	US\$1.08 billion	US\$1.58 billion
Number of Employees	26,374	56,000
Annual Export Amount	US\$1.2 billion	US\$2.3 billion
Percentage of Total Export Amount in Viet Nam	2.2%	3.2%

Sources: Information from the developer (The actual figures of each year are not available), JETRO statistics, Viet Nam statistics

2) Employment Creation

The Thang Long Industrial Park generated 26,374 jobs as of December 2006 and 56,000 as of December 2010. Thus the park generated more jobs than expected⁴⁷ as the Development Study in 1995 had forecasted 40,000 jobs in the park.

According to the beneficiary survey on the workers of the Thang Long Industrial Park, 90.4% of the interviewed workers replied that the income of their household increased after they started working in the park. 82.3% of the respondents answered their income increased by more than 30%.⁴⁸

5% of the potential workforce in Dong Anh District was employed in factories in the Thang Long Industrial Park.⁴⁹

3) Other Economic Impacts

The rural villages around the Thang Long Industrial Park have become commercial areas due to the increase of workers and population with urbanization. The areas' commercial activities have increased. The positive impact on people in those areas is evident, particularly in the eastern area of the highway. The market keeps growing as thousands of workers buy goods there on a

⁴⁶ It refers to enterprises whose main business is production of goods to export to foreign countries.

⁴⁷ Based on interviews

⁴⁸ Based on the beneficiary survey of workers

⁴⁹ Interviews with the Dong Anh District

daily basis. The living standards in the areas have improved.⁵⁰

(2) Impact which has been brought by housing development in the vicinity

While the population of Dong Anh was 0.24 million in 1997, it was 0.35 million in 2010⁵¹. With the development of infrastructure, the traffic network has expanded to the vicinity, which induces influx of people.⁵²

(3) Decrease of Density of Hanoi City

As the old town of Hanoi is a densely populated area with many historical buildings, Hanoi City plans to keep the administrative functions in the old town, and transfer the residential area to the suburbs. Since the congestion has been controlled by the policy of traffic control on entry into the old town and promotion of residential area transfer to the suburbs, it is not clear to what extent the project has helped reduce congestion. However, for Hanoi City whose old town was packed with shops, residences, and factories in a disorderly fashion, it is fair to say that the development with infrastructure upgrading in the suburbs has prevented congestion in the old town from worsening⁵³.

3.4.2 Other Impacts

(1) Impact on Natural Environment

The Ministry of Science and Technology (MOSTE) approved the EIA of this project in May 1999. The project had no collateral condition of the EIA.⁵⁴ As for environmental consideration during the construction, the contractor reached an agreement on construction time⁵⁵ with people in the vicinity to prevent noise and dust by construction vehicles. Expanding the farm road and making it wider ensured the safety of the passersby and vehicles.⁵⁶ The developer and the project surveyed surface water and underground water before the construction started. In relation to embankment materials, a survey was conducted to check whether or not it had heavy metal and chlorine organic compound. The construction has been done with consideration to the impact on the surface water, underground water and soil.⁵⁷

According to the interviews with people in the vicinity⁵⁸, there are no serious negative

⁵⁰ Interviews with community people and the Dong Anh District

⁵¹ Information of Dong Anh District

⁵² The results of interviews with the Dong Anh District and people in the vicinity. (July 2011)

⁵³ With the exception of an increase in a limited area due to a municipal merger, the population of the old town in Hanoi City has been stable for the last decade without any increase or decrease. (Source: Hanoi Statistical Yearbook)

⁵⁴ Interviews with a consulting firm

⁵⁵ If the surrounding land is farmland, the construction was continued at night. If it is a housing area, the construction was done in daytime.

⁵⁶ Interviews with a consulting firm

⁵⁷ Interviews with a consulting firm

⁵⁸ The residents of three areas, i.e., the industrial estate, the eastern side of highway, and the surrounding highway were sampled. Eventually, 42 people were interviewed.

impacts on the natural environment.

(2) Resident Transfer and Land Acquisition

In addition to the land acquisition at the time of the appraisal, the revised F/S required acquisition of a new land. The land acquisition proceeded based on the Prime Minister's approval. The transfer of residents was done in accordance with the Resettlement Action Plan (RAP).

The number of households that required the compensation is 6,400. Out of them, 6,120 needed compensation for farmland, and 280 for residences. The transferred households are 170. The total amount of land for resident transfer and land acquisition is 1,938,738 m².⁵⁹

Land acquisition requires the standard procedures such as planning, appraisal survey, notice, approval of residents, and decision-making. The acquisition of land was done in accordance with the normal procedures. However, it took considerable time to complete these procedures and obtain an official approval.⁶⁰ Along with prolonged construction, illegal occupation in public land occurred. Due to the soaring land price, it was necessary to adjust the amount of the compensation to the landowner. Although the initial plan stipulated that only landowners with a land title were eligible for compensation, compensation was required for people who did not have land titles. In flood adjustment ponds, fisherpersons who had been fishing in a customary way were compensated. Some residents rejected cash compensation and demanded compensation by land.

Laws and regulations had to be revised and formulated to compensate various types of people since the existing laws and regulations were unable to meet diverse demands.⁶¹

In general, the impacts that were expected in the appraisal documents have been successfully achieved.

3.5 Sustainability (Rating: ③)⁶²

The Hanoi People's Committee supervises the project while other agencies are in charge of its Operation and Maintenance (O&M). To evaluate the sustainability of the project's impact, the sustainability for each component is assessed, and then all the results are comprehensively analyzed as shown in the Appendix 2. It is fair to say that the effect of the project has high sustainability because there is no problem on O&M.

⁵⁹ The flood adjustment pond needed the acquisition of 35-ha land. In addition, the expansion of the roads in the eastern side of highway and the connection canals for flood adjustment pond required the additional land.

⁶⁰ As a result, whereas the plan was to take one year and three months at the appraisal, it took ten years.

⁶¹ Results of interviews with the Hanoi People's Committee. Residents who object to the compensation price have the right to file complaints against the compensation committee of the District People's Committee. Residents who still have objection on the revised price of compensation have the right to appeal complaints against Hanoi City. If necessary, Hanoi City addressed such complaints by revising the existing rules and regulations or formulation new ones. Decree No.197/2005/ND-CP 24/1/2005 and Decision No.108/2009/QĐ-UBND 29/9/2009 of HPC are newly formulated laws and regulations.

⁶² See the Appendix 2 in relation to the rating standard for each component and the rating results

3.5.1 Organizational Aspect of Operation and Maintenance

(1) Hanoi People's Committee (Supervising Agency)

The agencies in charge of O&M are the Department of Construction (DOC) and the Department of Transport (DOT). The division of labor between the DOC and the DOT is clear. The DOT is in charge of roads while the DOC is responsible for other facilities. At the time of the ex-post evaluation, both the DOC and the DOT have relevant coordination and cooperation with the Hanoi People's Committee. It is fair to say that, as the supervising agency, the Hanoi People's Committee is managing its functions and personnel properly.

(2) Roads

The O&M agency is Transport Construction Joint Stock Company, a former state-owned company that was converted to a joint stock corporation in 2005. The company has the duty to report to the DOT quarterly. The company employs 350 people and manages O&M of roads in Hanoi City and the vicinity of the Red River area. The roads of the project are managed by the company's Thang Long-Noi Bai O&M Office which has 15 staff members.

(3) Water Supply

The O&M agency is Hanoi Water Works which has seven affiliated companies. At present, Hanoi Water Works is state-owned and will be privatized in accordance with the privatization plan. Two of the affiliated companies have been privatized, and the rest will be privatized by 2015. Hanoi Water Works employs about 2,400 people in total. The Department of Construction of the Hanoi People's Committee is its supervising organization. Hanoi Water Works receives a budget from the Hanoi People's Committee while submitting technical reports to the Department of Construction four times annually, including a financial report once a year. The O&M office for the project is located in the Water Supply facility compound, which has 57 personnel working on O&M 24 hours a day.

(4) Sewage and Waste Water Treatment

Hanoi Sewage and Drainage State Owned Limited Company of the Hanoi People's Committee is in charge of O&M of sewage and waste water treatment. Although the budget is allocated by the Hanoi People's Committee, Hanoi Sewage and Drainage State Owned Limited Company technically reports to the Department of Construction and Finance. The company employs about 1,700 people and covers Hanoi City and the suburbs that had been outside the jurisdiction of Hanoi City before the municipal merger. There are three waste treatment plants in Hanoi. The waste treatment plant of the project is the largest among them.

The O&M team of the waste water treatment plant has 60 personnel working 24 hours a day. The personnel conduct a periodic water quality test involving sampling and analysis and send analysis results to the central institute of the company.

(5) Electricity Supply

Hanoi High Voltage Network Management Company, No. 30, is an O&M company which belongs to Hanoi Electricity of Viet Nam. Hanoi Electricity of Viet Nam is a state-owned company under Electricity of Viet Nam (EVN). Hanoi Electricity of Viet Nam has 30 electrical power transmission stations. The power station of the project is one of them. The O&M company sends a monthly activity and monitoring record to Hanoi Electricity of Viet Nam.

3.5.2 Technical Aspect of Operation and Maintenance

(1) Roads

The staff members of Transport Construction Joint Stock Company use the O&M manual of the Department of Transportation and maintain the roads properly. The O&M technical level of the staff members poses no problem. The company conducts training for the staff members on its own. The daily maintenance activities are to repair dents of pavement, manage weeds, clear road shoulders, clean the bridge surface and drain outlet, and check bridge columns and abutments. The regular maintenance activities are to put leading marks on the road, install signals, and check parapets.

(2) Water Supply

At the time of the handover, Hanoi Water Works received the O&M manual from the consulting firm and OJT training. The personnel of Hanoi Water Works take training to maintain the technical standards. Their daily maintenance duties are to confirm untreated water, observe all the facilities, and check the grids and water quality. Their periodic maintenance activities are to verify the quality of underground water, and check materials and machines every three to six months. They also check boreholes, pumping stations and purifying facilities and clean the purification facilities once a year.

(3) Sewage and Waste Water Treatment

The lecturers of the Institute of Environmental Technology at the Viet Nam Academy of Science and Technology are periodically invited to conduct training in order to upgrade the maintenance ability and technical standards of the personnel of Hanoi Sewage and Drainage State Owned Limited Company. The company also recruits new young staff members from the academy. The company receives OJT training at the handover from the consulting firm, and utilizes the O&M manual. The company's periodic maintenance duties for the waste water treatment facility are to change parts, replenish oil, and clean bearings. At present, it is not necessary to change parts since the operation started three years ago. The company carries out disposing garbage, checking the canals and repairing the faulty parts as O&M activities.

(4) Electricity Supply

The personnel of Hanoi High Voltage Network Management Company, No. 30, have a satisfactory technical level. They use the manual of Electricity of Viet Nam (EVN) and follow the EVN standards. Hanoi High Voltage Network Management Company implements staff training courses as necessary. The company personnel check facilities and equipment daily, and test the facilities once a year. They also check all the equipment parts twice a year.

3.5.3 Financial Aspect of Operation and Maintenance

(1) Hanoi People's Committee (Supervising Agency)

The technical supervising department of the Hanoi People's Committee receives financial reports from each O&M agency. The state-owned company submits budget requests to the finance division of the Hanoi People's Committee. The non-state company submits a financial report and is subject to the audit.

(2) Roads

The expenditure budget is disbursed according to the O&M plan that was explained at the handover. The budget itself is sufficient to maintain the roads of the project. The future budget is also expected to be confirmed.⁶³

Budget and Expenditure for Roads (Unit: VND)

Year	Plan	Actual
2010	45,000,000	45,000,000
2011	70,000,000	-

Source: Transport Construction Joint Stock Company, April 2011

(3) Water Supply

The cost requirements have been increasing because the costs of sterilization of turbid water caused by decrease in ground water and electricity for purifying the water. The budget is disbursed according to the O&M plan that was explained at the handover. The budget itself is sufficient to maintain water supply at the current level. The future budget is also expected to be confirmed.⁶⁴

Budget and Expenditure for Water Supply (Unit: VND)

Year	Requested Budget	Actual
2007	6,418,140,200	6,484,893,700
2008	8,214,536,800	8,510,847,000
2009	17,032,444,400	18,201,165,600
2010	36,633,837,700	37,331,598,030

Source: Hanoi Water Works, April 2011

⁶³ Interview with Transport Construction Joint Stock Company

⁶⁴ Interview with Hanoi Water Works

(4) Sewage, Waste Water Treatment

In relation to the cost of waste water treatment, the Hanoi People's Committee collects the waste water treatment fee only from the companies of the Thang Long Industrial Park. It needs the cost for replacing parts, oil replenishment, and maintenance of bearings. The waste water treatment budget by the financial department of the Hanoi People's Committee is replenished for the insufficient budget.

Budget and Expenditure for Sewage and Waste Water Treatment (Unit: VND)

Year	Requested Budget	Actual
2010	9.000,000,000	9.600,000,000
2011	9.000,000,000	-

Source: HSDC, June 2011

(5) Electricity Supply

Since Hanoi Electricity of Viet Nam is state-owned, the financial condition is fairly good. The firm is expected to have the same amount of budget in the future to maintain electricity supply at the current level. The actual expenditure on electricity supply in the last few years has varied from year to year due to the costs of maintaining items.

Budget and Expenditure for Electricity Supply (Unit: VND)

Year	Plan	Actual
2007	N/A	4,806,256,303
2008	N/A	6,449,682,324
2009	N/A	5,340,314,463
2010	N/A	4,837,619,309

Source: Hanoi EVN, April 2011

3.5.4 Current Status of Operation and Maintenance

The current status of O&M is evaluated on the basis of observations by a local infrastructure expert, interviews with the personnel, and confirmation of the O&M records.

The facilities of the roads, electricity and water supply are in a fairly good condition. However, people often dump garbage near the flood control adjustment ponds. This might damage the sewage system in the future. Thus people in the communities and the company related with the garbage disposal must be aware of how to dispose waste properly. The outlet of the dewatering channel has been eroded since 2009.⁶⁵ Although the outlet faces no serious problem at this point, it must be repaired sooner or later.

The sustainability of the O&M of the project is high because the O&M faces no problem in organizational, technical and financial aspects.

⁶⁵ When the water level of Red River is low, the outlet has been easily eroded due to the water pressure. The other reason of erosion is that the type of soil in the vicinity of the outlet is sand. At present, the training of O&M gives the guidance to the technical officers regarding this point.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project aims to promote industrial and regional development by infrastructure improvement. The evaluation shows the project's high relevance to Viet Nam's development policy and needs as well as the Japanese government's development aid policy. The project facilities in general are effectively used, leading to such impacts as creating jobs and meeting the demand for infrastructure of the people in the vicinity.

Although the project has been relatively inefficient as its duration has been prolonged, it faces no serious problem in the current operation and management system, and is expected to be managed appropriately in the future.

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

4.2 Recommendations

4.2.1 Recommendations to the executing agency

(1) In relation to the low operation rate of the waste water treatment facility, Hanoi City should make mid-term and long-term plans for full utilization of the facility including the domestic waste water treatment in the future.

(2) For O&M for canals and flood adjustment ponds, the project must gain communities' cooperation to enhance awareness in order not to dump garbage and waste in those areas. If the present situation continues, the dumping will harm the operation of the facilities and cause a serious problem in terms of sustainability.

4.2.2 Recommendations to JICA

None in particular

4.3 Lessons Learned

(1) The project is a good example of functional collaboration with the private sector and the public sector, as well as utilization of the JICA schemes of Development Study, and Yen Loan. The project was developed to support a private sector project right after a company decided to invest in industrial estate development based on the results of the Master Plan. The project also began to develop the infrastructure for the surrounding residential area. The project has achieved the intended economic effect. The successful factors of the project in a broad sense, including impact, are implementation of the qualified Development Study (JICA project), development by a private firm which has know-how on industrial estate (private sector's efforts), and support to the private sector by Yen Loan in the form of infrastructure development (JICA project).

(2) It is important to flexibly change the content and size of plans in industrial and regional development. The project had a good start in developing an industrial estate in a timely manner. However, Hanoi City has rapidly developed suburbs, requiring changes to the original plan of the project. The plan was subsequently revised.

Comparison of the Original and Actual Scope of the Project

	Original	Actual
1. Project Output		
Road	As stated in Appendix 1	As stated in Appendix 1
Water Supply		
Sewage		
Waste Water Treatment		
Electricity Supply		
2. Project Period	February 1997 - July 2001 (42 Months)	March 1997 - May 2009 (147 Months)
3. Project Cost		
Foreign Currency	7,547 million yen	7,377 million yen
Local Currency	5,916 million yen (651,943 million VND)	6,906 million yen (917,738 million VND)
Total	13,463 million yen	14,283 million yen
Yen Loan Portion	11,433 million yen	10,591 million yen
Exchange Rate	1 yen = 100.2 VND (As of October 1996)	1 yen = 132.89 VND (January 2000 - December 2008, weighted average)

Appendix 1: Output Changes

At Appraisal	At Completion in July 2009	Changes of Scope of Work
<p>1. Road</p> <ul style="list-style-type: none"> • Road (W = 50 m, L=4.0 km) • One (1) interchange • Collector, urban area (W = 40 m) 3.0km • Embankment/road for irrigation. canal (30 m) 2.5 km • Eastside of highway (W = 40 m) 1.0 km 	<p>1. Road</p> <ul style="list-style-type: none"> • Main Road A1 1.8 km, 1 Bridge • Main Road B1 1.2 km • Main Road B2 0.7 km • Overpass 0.7 km • Two Connection Roads: 2.4 km and 0.9 km • Collector, 2,643 m, one (1) Bridge 	<ul style="list-style-type: none"> • Road under overpass of highway was changed into main road A1, B1, and B2 due to higher material costs and the difficulty of land acquisition, for a total of 3.7 km. • Interchange was changed into an overpass to allow for traffic by pedestrians and motorbikes • The frontage road for the highway was changed into a connection road. • The frontage road for irrigation canal was changed into a 2,643-m collector road and 1 bridge. • Road on the eastern side of the highway was changed into a connection road.
<p>2. Water Supply</p> <ul style="list-style-type: none"> • Water purification plant with capacity of 60,000 m³/day • one 4,000 m³-reservoir • 7 Boreholes • 10.5 km piping system from plant 	<p>2. Water Supply</p> <ul style="list-style-type: none"> • Water purification plant with capacity of 51,360 m³/day • a 4,000 m³-reservoir • 2.4 km pipeline • Borehole in 8 places • 2-km pipeline to the purification plant 	<ul style="list-style-type: none"> • Water purification plant treating 60,000 m³/day was changed into 51,360 m³/day. • One borehole was added to increase the amount of water due to the shortage of intake water. • Pipeline from well to purification plant was changed from 10 km to 2 km because a well near the purification plant was available. • A pipeline for the water supply was added for the vicinity.
<p>3. Sewage</p> <ul style="list-style-type: none"> • Pumping station with capacity of 900 m³/minute • Drainage canal: 8.0 km • 4.0-km canal embankment (height: 2.2 m) 	<p>3. Sewage</p> <ul style="list-style-type: none"> • Pumping station with capacity of 1,200 m³/minutes • Two (2) pressure pumping stations • Canal for flood control 1.0 km • 0.37-km Canal (3m×3m×2 cells) • 4.95-km Viet Thang canal , 6 Bridges • 2.7-m pipeline • 0.9-km pipeline • Intake 0.62 km • 0.46-km drainage outlet, one (1) Bridge • 23.9-km communication cable • 17.9-km electrical cable • Flood control pond 	<ul style="list-style-type: none"> • The 900 m³/minute capacity of the pumping station was increased into 1200 m³/minute due to the difficulties of land acquisition for flood control pond, and two pressure pumping stations was added. • Sewage canal was improved as 4.95 km Viet Thang canal, canal for flood control 1.0 km with 7 bridges • 4.0 km canal embankment (height of 2.2 m) was used for canal construction. • Pipeline was needed in other places except the pipeline for sewage canal. • Intake was added and the place itself was changed due to the low level of underground water, which is fluctuating with the level of the Red River. • Sewage outlet with bridge is added due to their necessity

At Appraisal	At Completion in July 2009	Changes of Scope of Work
		<ul style="list-style-type: none"> • Electrical cable was added for the facility operation. • The flood control pond was renovated by using existing pond.
4. Waste Water Treatment <ul style="list-style-type: none"> • Waste water treatment plant with capacity of 66,000 m³/day 	4. Waste Water Treatment <ul style="list-style-type: none"> • Waste water treatment plant with capacity of 38,000 m³/day 	<ul style="list-style-type: none"> • The capacity was reduced to 38,000 m³/day because demand projection was lower than that of appraisal.
5. Electricity <ul style="list-style-type: none"> • Two power transmission stations (110 kV/22 kV) 80 MW • Transfer of existing distribution line (110 kV) • 22 kV new distribution line: 6.0km 	5. Electricity <ul style="list-style-type: none"> • One (1) power transmission station (110 kV/22 kV)80 MW • Power transmission line (110 kV) 4.8 m • Removal of existing power transmission line (110 kV) 3.5 km 	<ul style="list-style-type: none"> • The two power transmission station was changed into one place, because the developer constructed the power transmission station on their own. One power transmission station was built for the residential area and waste water treatment plant.

Sources: Technical Completion Report, July 2009; Appraisal Document; survey results

Appendix 2: Sustainability Rating Results

(1) Rating Criteria

Supervising Agency	Criteria
Institutional Aspect	<ul style="list-style-type: none"> • Are the supervisory system and personnel appointment appropriate? • Have the related organizations developed relationships enabling them to report and contact each other at any time? • Has a monitoring system based on environment-related rules and regulations been established?
Technical Aspect	<ul style="list-style-type: none"> • Have technical skills reached the level enabling operations to be supervised appropriately?
Financial Aspect	<ul style="list-style-type: none"> • Has the necessary financing been arranged to carry out the above activities?
O/M Agency	Criteria
Institutional Aspect	<ul style="list-style-type: none"> • Has an organization for O&M (and decision-making) been built? • Is there a possibility of privatization? If so, would it affect the project's continuation?
Technical Aspect	<ul style="list-style-type: none"> • Are there enough O&M staff members? • Have personnel with the expertise needed to operate the facilities been appointed, such as specialized technicians? • Has a training system been organized for O&M? What is the status of the actual training implementation? • Has an operational manual been devised and is it actually utilized? • Have the O&M activities been recorded appropriately?
Financial Aspect	<ul style="list-style-type: none"> • Are revenues and expenditures balanced? • Has a system to collect user fees been established with an eye on cost recovery? • If a deficit continues, would government subsidies be provided and are finances being managed appropriately?
Maintenance	<ul style="list-style-type: none"> • Have the facilities been maintained so that the planned functions can be carried out? • Has the maintenance environment been established so that, for example, spare parts can be procured? • Do regular maintenance activities cover the necessary activities? • Are problems addressed appropriately?

(2) Rating Results (③)

	Institution	Technical	Financial	O/M	Results
Supervising Agency: HPC	3	3	-	-	3
Road	3	3	2	3	2.75
Water Supply	3	3	3	2	2.75
Waste Water Treatment	2	2	2	2	2
Electricity	3	3	3	3	3
Sewage	2	2	2	2	2
Results	2.7	2.7	2.4	2.4	2.58

< Method of Rating Calculation >

1. Put sub-rating described below based on the comparison and actual achievement for each component.
2. 3: Highly satisfactory
2: Small concern, no major problem at evaluation
1: Major concern at evaluation
3. Calculate simple average according to the result of sub-ratings