

Vietnam

Ex-Post Evaluation of Japanese Technical Cooperation Project
The Project for Enhancing Capacity of Vietnamese Academy of Science and Technology
in Water Environment Protection

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0. Summary

This project aimed at creating a research base in Vietnam through improvement of technical capacity of IET with relation to water environment protection administration, and expected to contribute to betterment of water environment protection in Vietnam including the establishment of a national water quality monitoring system. At the time of planning the project, IET was expected to be responsible for giving technical recommendations to the government authorities for establishment of the monitoring system water quality. However, after the commencement of the project, the project staff members found serious difficulties to realize the original target, and strategic direction of the project needed to be reconsidered to be more realistic. As a result, while maintaining the effort to contribute to the establishment of the water quality monitoring system as much as possible, more emphasis was put on human resource development for local government agencies and research and development of more advanced technical areas. Despite this redirection of the project, the important conditions including high priority of water environment management for the Vietnamese government, existence of high demand for improvement of water quality and water quality protection, and also the reasonable development approach that IET, a research institute with comprehensive capability for environment management technologies, takes a role to disseminate appropriate technologies for water quality monitoring and wastewater treatment to local organizations through its branch laboratories are still maintained, therefore, relevance of the project is high.

Although the first part of the original Project Objective of contribution to the establishment of the monitoring system was not achieved, dissemination of relevant technologies was achieved, and impact was also partly achieved, therefore, the effectiveness is fair.

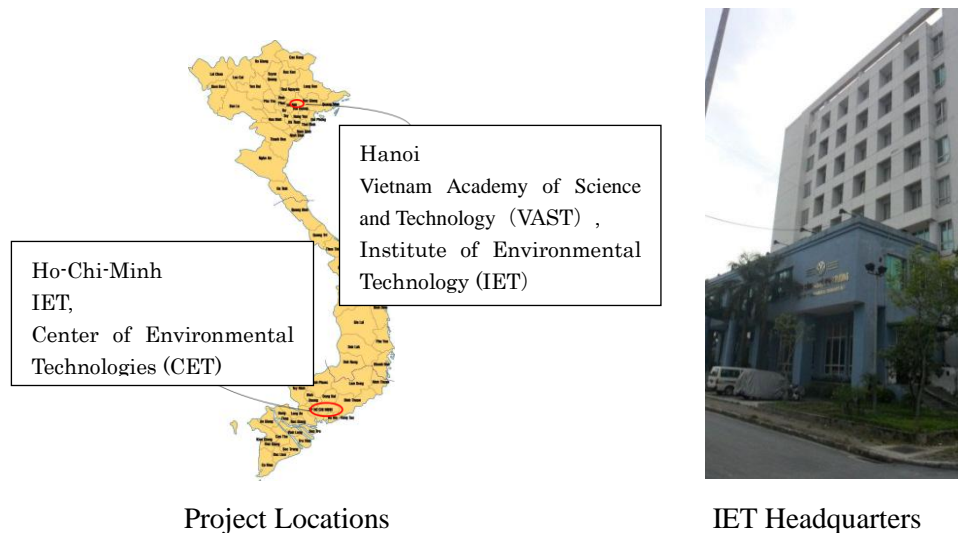
While the results of the experts dispatched and equipment provided exceeded the plan, this does not present a problem as there is a rational explanation for the additional input. Although the actual cost could not be compared with the budget plan, increase in the long-term experts and the equipment provision most likely made the total cost exceed the plan. Therefore the efficiency of the project is fair.

Financial and technical sustainability of the project effect was found good. After the revisions to the project design in respect to IET's position and roles for development of water environment management in Vietnam, there are sound environment surrounding the IET to continue its effort to develop and disseminate appropriate technologies for water environment management and to make contribution to policy formulations. Also, IET's organizational structure and its finances are stable enough. Therefore the sustainability of the project effect is high.

While this project displayed an insufficient effect for establishment of a national water quality monitoring system, which is a priority of the original plan, considered the real expectations to IET that it should provide necessary technical support to capacity of water environment management capacity of relevant organization in Vietnam, this project has accumulated effects.

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

1. Project Description



Project Locations

IET Headquarters

1.1 Background

In 1990s in Vietnam, the rapid industrialization led by the Doi Moi reform policy caused serious environmental pollution due to the waste products, exhaust gases, and waste water emitted by industrial plants. Concern over environmental problems was heightening not only within the government, but also among the general public. Among the various environmental problems, that of water contamination was becoming increasingly severe due to increased domestic wastewater with the rapid concentration of the urban population, groundwater contamination caused by elevated levels of untreated industrial wastewater, and poor sanitation as a result of the overflow of sewage from waterways during flooding. For example, the BOD¹ of waterways flowing through Hanoi was 25–45 mg/L, and in Ho Chi Minh was as much as 20–150 mg/L.

In such circumstances, the Government of Vietnam passed the Environmental Protection Law in 1993, and renewed the environmental standards in 1995. However, in terms of actual enforcement such as water-quality monitoring, the technology and facilities of the relevant agencies actually carrying out activities on the ground such as Department of Natural Resources and Environment (DONRE) of the provinces were inadequate, and the related laws and regulations did not produced a sufficient effect. Amidst this background, the Government of Vietnam requested Japan - with its rich experience in areas of environmental conservation such as water quality - to provide technical cooperation to improve skills in water quality analysis and the domain of wastewater treatment, and to improve the nation's capabilities in water environmental management.

The implementing agency of this project on the Vietnam side is the Institute of

¹ Biological Oxygen Demand. Total amount of dissolved oxygen in water used to oxidize or decompose organic matters in the water. The bigger the figure, the more the water is polluted. Usually used to measure extent of pollution of rivers. Generally, once the figure is 10mg/l or more, the water shows signs of pollution such as bad odor.

Environmental Technology (IET), which is in charge of research and development in the field of environmental technologies within the Vietnam Academy of Science and Technology (VAST). The VAST is an institution equivalent to a ministry within the administrative system of Vietnam, and has a status equal to that of the Ministry of Natural Resources and Environment (MONRE)². In order to effectively reflect the outputs of this project on environmental administration, it was judged during the preliminary study of the project that the MONRE's participation in this project is required, so the MONRE was added to the members of the Joint Coordinating Committee of this project.

1.2 Project Outline

The outline of the project subject to evaluation is as follows:

Overall Goal	The capacity of Vietnamese authorities related to the water environment protection will be improved.
Project Objective	The capacity of VAST related to water environment protection is improved.
Outputs	<p>Output 1: VAST researchers' abilities to conduct water quality monitoring and to develop analysis methods are improved.</p> <p>Output 2: VAST researchers' abilities to develop and apply suitable technologies on domestic and industrial wastewater treatment are improved.</p> <p>Output 3: VAST staff members' abilities to conduct training courses on water quality monitoring and wastewater treatment for central and local organizations are improved.</p> <p>Output 4: VAST researchers are to contribute MONRE's and related organizations' activities of water environment protection.</p>
Inputs	<p>Japanese Side:</p> <ol style="list-style-type: none"> 1. 17 Experts (6 for long-term, 11 for short-term) 2. 28 Trainees received (including 4 trainees from the preparation period of the previous year, e.g., those in water quality control courses, wastewater treatment/water quality analysis courses) 3. 2 Trainees for Third-Country Training Programs (total) 4. Equipment: 367,647,000 yen 5. Local Cost: 53,807,000 yen (including 31,094,000 yen for the construction of a wastewater treatment experimentation facility) 6. Others (including dispatch of study team) <p>Vietnam Side:</p> <ol style="list-style-type: none"> 1. 114 Counterparts 2. Equipment Purchasing: wastewater treatment facilities (chemical processing), consumables such as pharmaceutical products, low-cost equipment 3. Land and Facilities: Project space, Expert's Offices 4. Local Cost: 6.222 billion VND

² A section which is responsible for the environmental administration in MONRE is Vietnam Environment Administration (VEA).

Total Cost	Approximately 855,100,000 yen
Period of Cooperation	November 2003–October 2006
Vietnamese Agencies Involved	Vietnam Academy of Science and Technology (VAST)
Cooperation Agency in Japan	Ministry of the Environment
Related Project	“Enhancing Capacity of Vietnamese Academy of Science and Technology in Water Environment Protection Phase 2 (January 2008–January 2012);” individual experts dispatched (environmental policy advisor)

1.3 Outline of the Terminal Evaluation

The results of the terminal evaluation conducted in June 2006 are as follows.

1.3.1 Achievement of Overall Goal

When the project was implemented, although national/regional water quality monitoring became increasingly active, the methods and procedures of monitoring were not standardized, and there were many problems with accuracy. Here the probability of contributing to the achievement of the Overall Goal was evaluated as high if the standardization of the analysis methods proposed by this project yields results, and the IET’s skills were transferred to other relevant organizations.

1.3.2 Achievement of Project Objective

Although there was room for improvement in the quality of some of the outputs, the project Outputs were generally being achieved, and the Project Objective, namely, the capacity of VAST related to water environment protection is improved, was evaluated as more or less achieved.

On the other hand, in order to further increase the project's effectiveness, it was deemed that along with the strengthening of the government of Vietnam's measures on environmental improvement, stronger relations and a specific collaboration were necessary between IET and the relevant organizations such as the MONRE, and the MONRE's affiliated research institutes.

1.3.3 Recommendations

The following five recommendations were proposed in the terminal evaluation. The following table shows the measures taken vis-a-vis the recommendations at the time of this evaluation.

Recommendations at the time of completion	Measures taken by the time of follow-up
Aim to improve the quality of the products developed, and complete the remaining issues such as the development and submission of standard operating procedures for water quality monitoring and conducting wastewater treatment experiments (anaerobic digestion and compost processing). In addition, further absorb the knowledge, etc., of experts from the Japan International Cooperation Agency (JICA), and strive to further improve the quality of each output.	All scheduled wastewater treatment experiments were completed. The development of standard operating procedures (SOP) for water quality analysis continues, and efforts were being directed to improve on the quality of them.
Create a maintenance plan for project equipment, secure a budget, and consider a plan that takes into account the future renewal and upgrading/expansion of equipment. Furthermore, reliably secure and utilize the human resources. Additionally, with the completion of the new IET building, the Vietnam side should take responsibility for equipment relocation.	The equipment provided was appropriately maintained. While some equipment was unused as it was no longer required, the remainder was in routine usage at the time of this evaluation. The new IET building was completed in 2007, and all equipment was relocated appropriately.
In addition to the key administrative agencies MONRE and DONRE, positively approach various actors such as private sector corporations and universities, and in addition to cooperating on tackling actual issues related to the water environment, strengthen a productive collaboration in order to improve the capabilities of these various institutions. Improve practical technical capabilities through feedback from implementation of the project, and accumulate know-how.	Regular meetings with MONRE were held, and the IET was strengthening relations as much as possible. Neighboring DONRE and private sector corporations were being approached, and outsourced work was being received.
In future, DONRE offices throughout the country should directly oversee the management of Vietnam's water environment, and MONRE and other relevant agencies should contribute to reinforcing the technical capabilities of DONRE through collaboration.	Specific cases of contribution include convening regular meetings with MONRE, and the technical cooperation agreements concluded with Hanoi DONRE and Hung Yen province DONRE.

2. Outline of the Evaluation Study

2.1 External Evaluator

Tsuyoshi Ito, IC Net Limited

2.2 Duration of the Evaluation Study

Duration of the study: September, 2011 – November, 2012

Duration of the field study: December 11, 2011 – December 23, 2011; May 13, 2012

- May 20, 2012

2.3 Constraints during the Evaluation Study

None.

3. Results of the Evaluation (Rating: B³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Relevance with the Development Policy of Vietnam

3.1.1.1 Relevance to Development Policy

The “Seventh Five-Year Socioeconomic Development Plan (2001-2005)” mentions harmonizing development and environmental conservation, and makes particular note of the importance of monitoring and curbing environmental pollution in areas of high population density such as industrial districts and metropolitan areas.

The “Eighth Five-Year Socioeconomic Development Plan (2006-2010)” raises the “environment” as one of three axes that guarantees sustainable development.

The “National Environmental Protection Strategy 2001-2010” makes a declaration on strengthening efforts in the environmental field. Though the “Environmental Action Plan (2002-2007)” does not particularly locate the conservation of the water environment as a priority issue, it does include several related programs. Similarly, the “Five-Year Plan for Natural Resources and the Environment (2006-2010)” clearly specifies approaches to improve water quality.

In light of the above, this project was recognized to be consistent with the development policy of Vietnam.

3.1.1.2 Relevance of the Implementing Agencies within the Development Policy

The Vietnamese counterpart agency is the Institute of Environmental Technology (IET), which is a division of the Vietnam Academy of Science and Technology (VAST). The VAST is a research institution that possesses authority equal to the ministries, and has an equal relationship with the Ministry of Natural Resources and Environment (MONRE) which oversees environmental administration. When the project was planned, the VAST/IET was almost the only research institution handling environmental issues in Vietnam other than university-affiliated research institutions combining education and research. Hence it is fair to say that the IET was the only option in terms of selecting an institution to develop and spread research that contributes to the project's aim of improving environmental administration. Terminal evaluation of this project also concluded that despite the fact that role and responsibility demarcation among the government agencies relevant to environmental administration was not so well clarified during the planning of this project, it was a rational decision to select IET as the counterpart organization of this project.

This project was designed to make IET being able to formulate technical recommendations to MONRE for better water environmental management especially for establishment of a national water quality monitoring system and also to give technical support to develop human resources among DONRE and other local authorities in the field of water environment such as wastewater treatment (Project Objective). For this purpose, the project planned to enhance research and development capability of IET in the field of water environment management

³ A: Highly satisfactory; B: Satisfactory; C: Partially satisfactory; D: Unsatisfactory

⁴ ③: High; ②: Fair; ①: Low

especially for water quality monitoring and wastewater treatment (project Outputs). Through these efforts, the project was expected to contribute to the establishment of water monitoring system, strengthening of water environment management administration (mainly MONRE and DONRE), and dissemination of proper wastewater treatment technologies in Vietnam (Overall Goal of the project). As mentioned before, IET is independent from MONRE and the project was not requested by MONRE, however, in order to secure the pathway of technical recommendations by IET to legislative administrations, MONRE was included in the member of the Joint Coordinating Committee (JCC) of the project. The project continued its effort to maintain the communications and coordination with MONRE throughout the project period.

However, after commencing the project, following facts became clear: standardization of water quality monitoring method had been already in progress under MONRE; MONRE's technical level was not sufficient enough to handle IET's technical recommendations to utilize them for policy making⁵; and IET and MONRE are in different lines of government administration and MONRE does not have to fully accept IET's recommendations. On top of these, towards the end of the project period, the MONRE sat up two affiliated agencies to oversee the technical side of environmental conservation. One of the affiliates is the Center for Environmental Monitoring (CEM) and the other is the Center for Environmental Consultancy and Technology (CECT). The former is an agency that oversees the construction and supervision of a system of environmental monitoring focusing on water quality on a national level, and the later is one which provides technical guidance to related agencies on the research and development of environmental related technology including wastewater treatment. The agencies were established in 2006 and 2007 respectively (CECT existed beforehand as a division of the MONRE). The establishment plan was already more or less recognized at the final stages of the project.

After finding these circumstances, Japanese experts and members of Japanese advisory committee for this project recognized an urgent need to reconsider the direction of the project. As a result, adjustment of the focus point of the project Objective was made. Instead of the contribution to establishment of the national water quality monitoring system through standardization of water analysis procedure, the following two points were selected to be the new focuses: (1) research and development that emphasizes more advanced technology in the field of water management, and (2) the transfer of technology of water management technologies to local administrative agencies and the private sector. Also at the Overall Goal level, contribution to government agencies and private sector for their technical improvement with regard to water environment management through the above (1) and (2) was set as the priority rather than contribution to establishment of water quality monitoring system. However, these adjustments of the project strategy were not officially documented in any project reports, and the terminal evaluation of this project used the original performance indicator to measure the achievement of the project. This point is further discussed in the section of effectiveness of this evaluation report.

Given that the adjustment of the project direction was made, still, IET can be an appropriate implementing agency of this project. CEM and CECT created by MONRE are responsible for the similar activities to IET's, however, IET was already equipped with better facilities and equipment, IET had better accumulation of experience of research and development in the field,

⁵ According to Japanese experts, there is an opinion that MONRE did not well establish its capability of policy formulation and legislative administration as well.

and IET's two branches in major cities gave a foundation for nationwide extension of its service⁶. IET was also recognized an institute which possess advanced and comprehensive capability in the field of environmental management more than the water environment. IET's functions of training and consulting service gives another advantage compared to other similar organizations that IET is a suitable organization which is responsible of technical transfer to local government agencies. These reasons were recognized as proper justification to continue the project for the phase 2.

Therefore, IET has been maintaining its justifiability as the implementing agency of this project from the planning stage to the time of this evaluation.

3.1.2 Relevance with the Development Needs of Vietnam

One side-effect of the rapid economic growth in 1990s after the Doi Moi reform policy was the serious environmental pollution due to the solid waste, exhaust gases, and waste water primarily emitted by industrial plants. Amidst this, in addition to pollution from industrial plants, as a result of increased wastewater due to population expansion, the contamination of water quality with the pollution of groundwater and waterways became a very severe problem. However, on the other hand, pressing issues that required resolution were the serious inadequacy of monitoring technology and facilities, and slow spreading of appropriate wastewater treatment technologies among the private industrial sector.

From 2005 to 2009, almost no decline was seen in the BOD level of primary waterways and lakes, or in the COD⁷ and ammonia concentration of coastal waters. Economic development and population increase place a large burden on the water environment, and there are many remaining challenges to improving water quality in Vietnam.

IET was created in 2002 reorganizing departments of VAST to put all the sections relevant to environmental issues together and still needed improvement of technical level of the staff members and upgrading of laboratory facilities and equipment.

After the commencement of the project, there were some realities different from the original expectation during the planning stage revealed, and the situation was against the project's effort to give direct contribution to the establishment of water quality monitoring system. However, it does not mean the project lost its justification. This project has created a national research base for water environment protection in Vietnam established a foundation of technologies of water quality monitoring and wastewater treatment and provided equipment necessary for actualization of the researches. These contributions of the project are in accordance with the development needs of the country.

Under these circumstances, it can be assessed that the project is, still at the time of this evaluation, relevant with the needs of the country in terms of improvement of techniques of water purification and water quality monitoring.

⁶ According to Japanese experts, there is an opinion as follows. While MONRE, in reality, has difficulties to enforce its authority over DONREs, IET is under the Prime Ministers direction and it gives IET a better position to work with DONRE.

⁷ Chemical Oxygen Demand. Total amount of dissolved oxygen in water used organic matters in the water is oxidized by potassium permanganate. The bigger the figure, the more the water is polluted. Usually, COD is used to measure extent of pollution of lakes and the sea. This is because that respiration of microorganism in lakes and salt in the sea water affect the measurement of BOD significantly.

3.1.3 Relevance with Japan's ODA Policy

Japan's Country Assistance Program for Vietnam of 2002 cites the environment as a key area, positing that assistance must be considered to counteract the increasingly severe situation of deforestation, and the pollution of the soil, water and atmosphere, and guidelines and environmental standards also need to be improved in order to make Vietnam's established environmental conservation law viable. Hence it is fair to say that this project is consistent with this assistance policy.

Likewise, this project was identified as a method to "improve the capabilities of study and research institutions," which is Output 2 of the currently underway "Vietnam National Urban Water Environment Program (2007-2015)." Here it was hoped that improvements in the technical capabilities of the IET would contribute to the program purpose in two main ways, namely by (1) providing a technical back-up to the actions of the central government in improving environmental administration, and (2) training personnel within the administrative institutions on the level of enforcement.

In light of the above, despite that there was an adjustment of the direction of the project, the adjustment was reasonable, and maintained the relevance. As a result, 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.

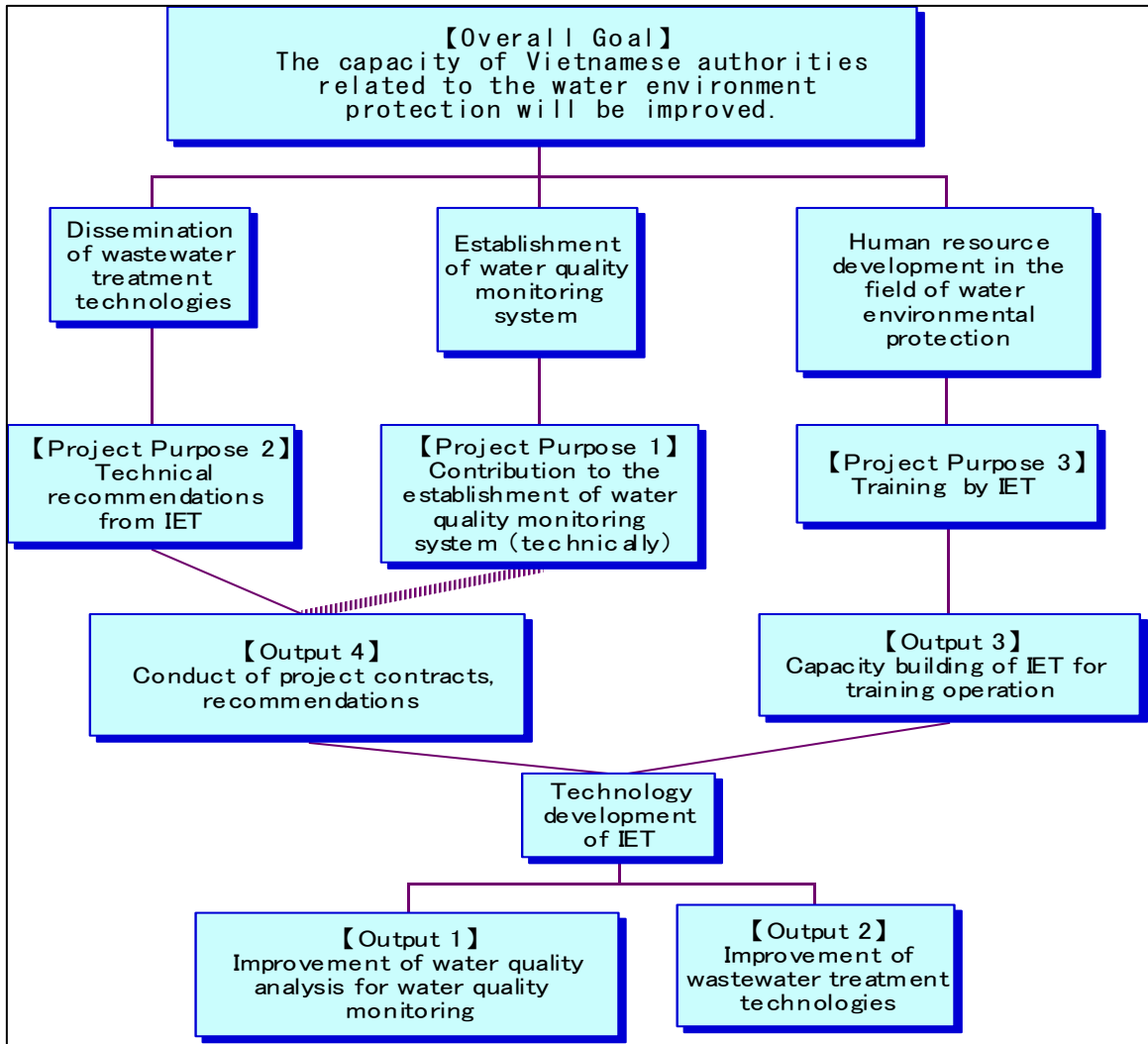
3.2 Effectiveness and Impact (Rating: ②)⁸

As mentioned above, after finding the real situation surrounding IET in the overall picture of water environment protection in Vietnam, adjustment of strategy of the project was necessary. The original structure of the objectives of the project can be depicted as Figure 1. In this structure, the linkage shown by a dotted line, which means a pathway between the IET's recommendations to the policy formulation, was lost unexpectedly. Due to this, priority setting of performance indicators of the Project Objective needed to be adjusted, however, the description of the Project Objective, namely "The capacity of VAST related to water environment protection is improved" and details of the project Outputs were not affected.

However, since the history of the adjustment of project strategy was not documented in the project reports, it is not easy when exactly the adjustment took place.

Based on these, this evaluation applied the original project plan and the performance indicators for judgment of effectiveness/impact with consideration of the influence of the strategy adjustment.

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



Source: Evaluator created from collected material

Figure 1: Objective Structure of the Project

3.2.1 Project Outputs

3.2.1.1 Project Output

The four following Outputs were established as necessary to achieving the Project Objective.

1) Output 1

Outline	Indicator
VAST researchers' abilities to conduct water quality monitoring and to develop analysis methods are improved.	1. Number of analytical method mastered by VAST(IET) researchers through the technical transfer
	2. Number of reports on development of SOP on water quality analysis

In relation to indicator 1, through the project's activities, analysis skills for 12 types of water quality analysis instrument were acquired. For each instrument, research reports related to the instrument functions, analysis principle and operating methods were created,

and screening was completed by VAST's project evaluation committee.

In relation to indicator 2, of the 31 environmental standards in Vietnam, the creation of a standard operating procedure (SOP) was completed for 18 standards.

In the PDM, although no final target value was indicated such as the number of analysis methods to be acquired or the number of SOPs to be prepared, interviews with the IET showed that outputs during the project period were in keeping with the IET's expectations in terms of strengthening their performance at the time.

Given the above, it can be said that the initial objective was achieved for the Output 1.

2) Output 2

Outline	Indicator
VAST researchers' abilities to develop and apply suitable technologies on domestic and industrial wastewater treatment are improved.	1. Improvement of wastewater treatment system in VAST
	2. Number of case studies requested by MONRE and other organizations

In terms of the performance related to indicator 1, the IET staff themselves completed the VAST and IET's wastewater treatment facility for which they had created the basic design, and acquired treatment skills through operating nine pieces of wastewater treatment laboratory equipment belonging to the facility. However, it would be essentially preferable if laboratory wastewater and domestic wastewater were separated, and harmful effluent was collected separately⁹, so a "Master Plan for Wastewater Management in VAST" was created and submitted to the VAST. Nevertheless, the volume of laboratory wastewater within the VAST overall was lower than that of domestic wastewater, and laboratory wastewater was diluted. Thus there is little need for separate treatment, and this was judged not to be a technical problem, and was not ultimately carried through.

In relation to indicator 2, five wastewater treatment studies were conducted.

From the above results, it can be said that the initial objective was achieved for the Output 2. The aim of the Output 2 was to establish the basic knowledge and skills of IET staff in wastewater treatment techniques. The knowledge and skills acquired through these activities enable the IET staff to provide a consulting service related to wastewater treatment to external clients, and the required level of achievement has been reached.

3) Output 3

Outline	Indicator
VAST staff members' abilities to conduct training courses on water quality monitoring and wastewater treatment for central and local organizations are improved.	1. More than six teaching materials are made by VAST (IET) staff members
	2. Curricula are properly developed for each training course

⁹ Organic compounds and metals contained in laboratory wastewater should be isolated and treated properly. If domestic wastewater is not separated, total amount of water to be treated becomes large and capacity of a treatment facility should be set large. Because of these two reasons, separation of laboratory wastewater and domestic wastewater is preferable.

Related to indicator 1, a total of 31 types of training material were created. They include 10 types of training material for water quality monitoring and analysis, and 16 types of material for wastewater treatment technology training.

Related to indicator 2, an investigation was conducted into the needs of the 64 regional Departments of Natural Resources and Environment (DONRE) throughout the country, and a draft “Effective Training Curriculum” was created based on the results. However, this was not a detailed curriculum; rather a training plan. Although a proposal was submitted to the MONRE based on the curriculum, the course did not actually get underway.

From this it can be said that the Output 3 was more or less achieved.

4) Output 4

Outline	Indicator
VAST researchers are to contribute MONRE’s and related organizations’ activities of water environment protection.	1. Number of projects given by MONRE and related organizations to VAST (IET)
	2. Number of evaluation reports for relevant projects of other organizations

Related to indicator 1, there were three projects in 2002, two in 2003, three in 2004, four in 2005, and one until the completion of the project in 2006. The projects were implemented in response to requests from government organizations such as the MONRE and DONRE. Approaches related to technical support were also received from other donors such as Denmark and Switzerland that support the environmental domain.

Related to indicator 2, there were results from four cases in 2004 and three cases in 2005. Consulting and engineering services were also offered in relation to wastewater treatment in hospitals and private sector corporations. It follows that the IET was now able to follow through with consulting and studies commissioned by external organizations. Hence it is fair to say that this project succeeded in furnishing the IET with the basic capabilities to respond to society's needs.

The terminal evaluation of this project described that one of the important contribution of this Output 4 was to formulate recommendations on water quality monitoring, standard of procedure of water quality analysis and so on. An opinion brief on several of the adopted water quality standards that did not reflect the current situation in Vietnam was created and submitted to the MONRE and the Ministry of Science & Technology (MOST). Similarly, in September 2005, a recommendation on the standardization of water quality analysis was submitted to the Vietnam Standards and Quality Agency (a sub-division of the MOST). Under Vietnam's administrative procedures, the MONRE - which has jurisdiction over water quality management - is required to put forward its views on these and begin investigations into making them into new legislation. The MONRE, however, did not put forward any views, which leads us to the present¹⁰. One of the crucial aims of the Output 4 was to contribute to creating results from the technical level in the formulation of IET's policies. However, it can be said that an adequate output has not necessarily been achieved in line with the initial plan of the project.

Accordingly, some problems persist for the Output 4.

¹⁰ This evaluation could not identify exact reason of this event. According to a Japanese expert, there is an opinion that this is another evidence showing MONRE's weak capability as an administrative organization.

3.2.1.2 Achievement of the Project Objectives

The Project Objective is determined as follows.

Outline	Indicator
The capacity of VAST related to water environment protection is improved.	1. Water quality monitoring reports are submitted to MONRE by VAST (IET)
	2. Number of organizations being advised by VAST (IET) will increase compared to the year 2002.
	3. Participants trained by VAST (IET) will reach 100 persons

1) Indicator 1: Water quality monitoring reports are submitted to MONRE by VAST (IET)

As discussed already, due to the unexpected situations found after the commencement of the project, at the time of the terminal evaluation for this project, the water quality monitoring report form had not been submitted. The national water quality monitoring system itself was still in its formative stage. However, a water quality monitoring manual was created in relation to work on the ground and IET's technical capacity of water quality analysis was improved.

When this project was completed, regarding the water quality monitoring system at the national level, the arrangement of the monitoring points and monitoring agent (both internally and externally manufactured) at each of the points had not been constructed, and as mentioned in 3.1.1 of this report, MONRE created CEM in 2006, close to the end of the project period, to commission the work to establish the water quality monitoring system.

2) Indicator 2: Number of organizations being advised by VAST (IET) will increase compared to the year 2002

There is no figure for the year 2002. However, the trend is one of increase with three cases in 2003, 25 cases in 2004, 32 cases in 2005 and 11 cases by the end of the project in 2006. They mainly include water quality analysis and technical consultations on wastewater treatment. Though the number of cases is not stable, the increasing trend is undeniable considering the basis of three cases in 2003. Similarly, as seen with the status of achievement of the Output 4, the ability to provide technical services externally was clearly heightened, and the Project Objective of "improved performance" can be said to have been achieved.

3) Indicator 3: Participants trained by VAST (IET)

Training was conducted mainly for staff members of DONRE and other government organizations, and for master degree students. In the two sessions of training (three courses) conducted in 2005, a total of 213 people participated, which greatly exceeded the target of 100 people, and achieved the objective.

Thus for the indicator 2 and 3, the project achieved the target more or less, however, for the indicator 1, the target was not achieved due to the unexpected changes in the situations with regard to the water quality monitoring. This project has somewhat achieved its objectives, therefore, its effectiveness is fair.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

The Overall Goal of this project is determined as follows.

Outline	Indicator
The capacity of Vietnamese authorities related to the water environment protection will be improved.	1. Number of monitoring points
	2. Number of transferred technologies being applied in actuality
	3. Number of technological issues recommended by VAST (IET) to related authorities

The lost linkage shown in the Figure 1, depicted by a dotted line, also affected the project's contribution at the impact level, and the contributions of IET to the establishment of water quality monitoring system and MONRE's policy formulation have been in indirect forms. After the adjustment of the project strategy, the project aimed to achieve the Overall Goal through strengthening IET's contribution to the research and development work on advanced technologies relevant to water environment protection and human resource development or the technical transfer to the local organizations.

1) Indicator 1: Number of monitoring points

In relation to the construction of water quality monitoring points throughout the country, even though monitoring centers were set up to control the monitoring activities in 60 out of the total 64 ministries, the construction of an overall mechanism that includes the installation of individual monitoring points has not yet been established. On top of this, according to CEM, standard operating procedures for the water quality monitoring was already prepared by MONRE and its collaborating organizations, and any organizations which take part in the water quality monitoring is obliged to follow these standards. However, there still is room for improvement in the standards, and this project has made continuous effort to improve them by preparing and introducing water quality monitoring manuals, SOPs to relevant organizations. At the time of this evaluation, the construction of a water quality monitoring system had been delegated to the MONRE's subsidiary CEM. According to CEM, the construction of a national water quality monitoring system will take time until 2020.

Although, it was not possible to specifically confirm the general financial situations of the DONRE, which actually conducts the monitoring and the budget allocated for environmental management, according to CEM, the environment budget continues to decline due to the recent setback of the government finances. Also, competition with other environment-related work has meant that securing a budget for monitoring is not necessarily easy at present.

Amidst such circumstances, IET has participated in taskforces and study groups organized by MONRE and relevant workshops aiming to make contribution to the policy making of the government. It is reasonable to expect that if IET will continue to give technical inputs to these kinds of platforms based on its accumulated knowledge and experiences, it will be able to contribute to the formation of the water quality monitoring system at least indirectly.

2) Indicator 2: Number of transferred technologies being applied in actuality

As a result of the project, IET has enhanced its capacity of water analysis, water quality monitoring and wastewater treatment. Based on the established ability, IET has been expanding its services to other relevant organizations by giving technical consultations and training. At the time of this evaluation, these activities for technical transfer to other organizations have been conducted as normal operation of IET. In areas such as Hung Yen Province which adjoins Hanoi, technical support and training has been provided to the DONRE, and the IET routinely carries out technology transfer to related agencies and organizations.

This evaluation study confirmed two points in relation to the operations cooperation agreements that the IET has individually entered into. The first is that, the agreement with the Hanoi DONRE is not a general operations cooperation agreement, but a cooperation agreement specific to introduction of a system of pollution control managers. The other point is that the agreement with Hung Yen Province relates to technical support within more general operations.

Similarly, such services as consulting services are also being provided to private sector corporations. Through such activities, the wastewater treatment facilities planned by the IET are also being constructed. However, there are roughly ten cases of such activities annually, which cannot be viewed as a major contribution from the perspective of “improving capabilities related to protecting the water environment in Vietnam.” In order to promote this service, strengthening of linkage between the headquarters in Hanoi and two branches, and further capacity building of the branches are necessary. This aspect was one of the main purposes of the Phase 2 of this project.

3) Indicator 3: Number of technological issues recommended by VAST (IET) to related authorities

This indicator is representing IET’s ability of recommendation formulation which will result in variety of contributions to the water environment management administration of the government. According to the response to the questionnaire filled by IET during this evaluation, IET has been made 5 to 6 of concrete recommendations to the government authorities. They include proposals and consultations to MONRE, DONRE and other relevant organizations. On the other hand, the project documents do not show any particular target with regard to this indicator, and it is difficult to judge the extent of the achievement.

Meanwhile, it is not clear how many of the recommendations from IET would be actually used for policy formulation or environmental administration, therefore, it is fair to say that actual contribution of IET for improvement of water environment control is still uncertain. For example, the past proposals submitted to MONRE have not been fully adopted. MONRE recognizes IET as a partner organization with good technical expertise, however, the position of IET for MONRE is just one of the many other institutions, and MONRE has to select an organization for contract work through an open bidding. Therefore, MONRE is not able to intentionally select IET for a main recipient of its outsourced work. IET has provided technical consulting services outside Hanoi, but limited to some provinces including Hung Yen, Hai Phong and Ho-Chi-Minh. It is still many areas to be covered if it aims to contribute at the national level.

From the above, although Overall Goal was somewhat achieved for its target indicator 2, but

the achievement indicator 1 was lower than the plan due to the changes in the situations, and the indicator 3 was not able to judge the magnitude of the achievement due to lack of information to specify the target figure for this indicator. Therefore, the Overall Goal was partially not achieved.

After these, the phase 2 of the project (2008-2012) reflected the strategic adjustment of this project and put more emphasis on further enhancement of technical capacity of IET and extension of technologies, with continuation of efforts to support the establishment of water quality monitoring system. The phase 2 project maintained a part of the Overall Goal of this project (phase 1), which was the technical transfer to DONRE and other relevant organizations (indicator 2). Phase 2 of the project also prioritized establishment and proper management of an integrated network between the headquarters and branches of IET, aiming for creation of regional centers for extension of technologies to related organizations and private sector nationwide. It is fair to expect that this network will gradually be effective.

3.2.2.2 Other Impacts

This project was expected to oversee the training of related personnel and provide a technical backup within the Japan International Cooperation Agency’s “Vietnam Urban Water Environment Improvement Program.” As the table below indicates, technical supports were provided directly and indirectly to the other projects, and programmatic collaboration was seen between the projects in this area.

Table1: Contributions of the project to the Vietnam Urban Water Environment Program

Project Name (Year implemented)	IET’s Contribution
The Study for Water Environment Management on River Basins in Vietnam (May 2008–January 2010)	Providing technical advice and information
The Ha Long Bay Environmental Protection Project (March 2010–March 2013)	Providing consulting and analysis services
Project to Improve Water Environmental Management Capabilities in Vietnam (June 2010–June 2013)	Participation of IET staff members as resource personnel
Ho Chi Minh City Water Environment Improvement Project (2000–2007)	Direct participation in project activities, participation in evaluation activities

Source: Questionnaire to IET, interviews of IET staff members

Viewing performance in relation to the Outputs and Project Objective mentioned earlier, it can be said that the IET has been equipped with capabilities of providing technical guidance and formulating proposals for the relevant organizations, and is actually commencing various approaches to apply these capabilities. In terms of individual guidance and training to private sector corporations and other relevant administrative agencies, though it must be conceded that the force of this impact on the national scale is yet limited, results are improving steadily. Phase 2 of this project assisted strengthening of the IET’s branch network so that IET’s service for

environmental protection can be nationwide, therefore, the service range of IET is expected to be expanded. On this point, it is fair to view the situation that the IET is using the basis constructed by this project in its ongoing effort to contribute to higher development targets. The response to a questionnaire from the IET was also that the remaining results of this project had satisfied its expectations.

As described above, in terms of the Project Objective, the indicator 1 (Submission of monitoring report to MONRE) could not be achieved due to the fact that the establishment of the monitoring system itself did not progress as expected, and the indicators 2 (Number of organizations advised) and 3 (number of trained people) were achieved. Regarding the level of achievement of the Overall Goal, the indicator 2 (technical transfer of water environment protection and their application) was achieved, but the indicator 1 (number of monitoring points) was not achieved due to the IET's position in the water environment management administration was not favorable for the project, and the indicator 3 (number of proposals to the authorities and other relevant organizations) could not be judged the achievement due to lack of target setting at the planning stage of the project. Although there is no official record, considered the adjustment of the project direction, there is a acceptable reason for insufficient achievement of the indicator 1 of the Project Objective and the indicator 1 of the Overall Goal.

Given these, this project has somewhat achieved its objectives, therefore, its effectiveness and impact is fair.

Phase 2 of the project prioritized research and development of advanced technologies and enhancement of function of the branches, with continuation of efforts to support the establishment of water quality monitoring system. It is fair to expect that further materialization of project effect will emerge.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

The following table summarizes the planned inputs and the performance at the time of completion.

Elements of Inputs	Plan	Performance (at completion)
(1) Experts	3 for Long-term: Environmental management, water analysis, water treatment Short-term (dispatched as necessary)	6 for Long-term (136 man-months: water environment management, water analysis, water treatment, operational coordination, monitoring) 11 for Short-term (24 man-months)
(2) Trainees Received	Approximately 5/annually (e.g., water treatment, water quality analysis)	28 trainees (including 4 trainees from the preparation period of the previous year. e.g., water quality control courses, wastewater treatment/water quality analysis courses)

(3) Equipment	Approximately 180 million yen	Total Cost: 367.647 million yen
Total Project Cost	No data available	855.1 million yen
Total Local Cost	No data available	53.80 million yen (including 31.094 million yen for the construction of a wastewater treatment experimentation facility)

3.3.1.1 Elements of Inputs

Of the inputs from the Japanese side, the actual inputs of the long-term experts and the equipment were over the plan. According to interviews to the JICA's Advisory Committee members of the project, at the time of planning, though the Japanese side had wished to start on a smaller scale, and had anticipated three long-term experts, project progress required that further experts were added as it was judged that the dispatch of a project coordinator was indispensable. Regarding the experts in charge of monitoring, at the time of planning it was expected for the experts overseeing water quality analysis to perform combined duties and oversee operations to improve water quality monitoring. However, it was explained that there was more technical transfer of analysis methods than anticipated, and the experts could not handle the water quality monitoring duties, so additional experts were dispatched.

To be exact, the three long-term experts in the plan refer to "three fields." There are 108 man-months over the three-year period of the project. The result of 136 man-months is 28 man-months longer than planned, which is an increase of approximately two man-years. This increase was appropriate considering the situations explained above.

Regarding the equipment, the equipment list was strictly scrutinized based on a similar policy at the planning stage of limiting the budget as much as possible. However, in order for the IET to become a state-certified reference laboratory during the project, it was required to be suitably outfitted and the purchase of additional analysis instruments proved necessary.

The number of trainees received also nearly doubled that of the plan, but this is not a problem since many participated in group training, which are funded by other budget than the project.

In terms of the Vietnam side's inputs, there were 27 counterparts on the plan, which rose to 144 in actual performance. While it is common for counterparts to increase as a ripple of the project's effects to more personnel is sought, this is not considered a problem. There was no evidence that the increase in counterparts led to any major increase in costs.

3.3.1.2 Project Cost

The total cost of the project was approximately 855 million yen. There can be no comparison with the plan as the plan mentioned no value. However, considering the fact that the equipment provision mentioned above added 200 million yen to the project cost, it is likely that the actual total project cost was higher than planned. Nevertheless, it is a problem that the budget plan was not properly filed and managed.

3.3.1.3 Period of Cooperation

The cooperation period was as planned with a performance of 36 months against the planned 36 months.

From the above, compared with the generated Outputs of the project, the period of cooperation was as planned. Although the actual cost could not be compared with the plan, increase in the long-term experts and the equipment provision most likely made the total cost exceed the plan. The inputs were appropriate for producing the Outputs and achieving the Project Objective, while the total cost exceeded the plan, therefore efficiency of the project is fair.

3.4 Sustainability (Rating: ③)

3.4.1 Related Policy towards the Project

Improving the abilities of managers within both the DONRE and the environment related departments of local authorities was deemed a major issue in the “Five-Year Plan for Natural Resources and the Environment (2006-2010).” Ever since, and at the time of this evaluation, it has been recognized that approaches to make the allocation of Pollution Control Managers obligatory, and the tightening of monitoring and regulation of industrial wastewater are crucial to environmental conservation and management. Coinciding with this, organizations with knowledge and skills related to water quality monitoring are being sought in order to effectively launch national policies and environmental policies. It can be said that a favorable environment now exists in terms of the legal and political perspective, as well as of the demand for the IET’s training and consulting services in this sector.

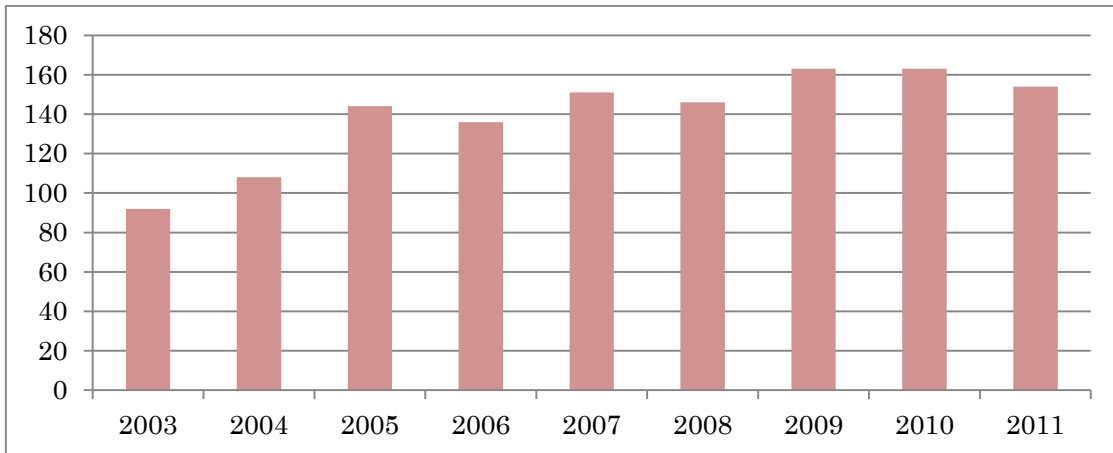
On the other hand, a sense of the expectation on the IET to become a receptacle for advanced technologies that exceed current analysis techniques and wastewater treatment technologies was revealed from interviews with the MONRE and others. Areas of the advanced technologies include the ones for monitoring and treatment of pollutants not yet detected in Vietnam, such as toxic organic compounds and endocrine disruptor (or environmental hormone). It is expected that IET would be able to predict and detect the pollutants using existing experiences from Japan and other countries and develop appropriate technology to control those substances, which is suitable for the Vietnamese conditions.

3.4.2 Institutional and Operational Aspects of the Implementing Agency

IET has five departments including Department of Environmental Engineering, Dept. of Environmental Quality Analysis, Dept. of Environmental Planning, Dept. of Environmental Electrochemistry and Dept. of Microbiology. Because of this comprehensive coverage of specialties, IET has ability to deal environmental issues with an integrated manner, not from the water aspect only. IET has two branches in Ho-Chi-Minh and these offices are the core stations for nationwide extension. Total numbers of IET staff members from 2003 to 2011 are shown in the figure 2.

There have been no major changes within the IET which is a stable organization. It is fair to say that from 2005 onwards, the number of IET staff members and distribution within the departments has gradually increased and remained relatively stable.

Of the 143 staff members registered during the project, 112 are still registered. Of those staff members leaving their jobs, eight retired, and 23 left their jobs in real terms - which accounts for 16% overall. Social need is high, and when bearing in mind those engineers in the field can hope to change jobs, it is thought that a staff turnover of 16% seven years after project completion is not particularly a high figure.



Source: IET

Figure 2: Number of staff members of IET

The IET has set up a unique salary system that utilizes independent finances acquired through such means as consulting services and projects received. In addition, the IET consciously motivates staff through such means as improving working conditions and providing training opportunities.

3.4.3 Technical Aspects of the Implementing Agency

Even after the completion of the project, standard operating procedures (SOP) were being continually created. This became possible not only at the Hanoi headquarters, but also at the Ho Chi Minh and Da Nang branch offices. At the time of this evaluation, there were 77 SOPs in total. Two branches in Ho-Chi-Minh and Da Nang have also been certified as reference laboratories. These can be seen as evidences of the IET's continual progress based on the achievements of this project.

There are around five external orders each year from the MONRE and around three or four continually contracted water treatment projects each year from other organizations and private sector corporations.

At the time of this evaluation, IET does not have regular training courses open for public, however, it regularly conducts a regular master degree program. IET also conduct on demand training courses, therefore, capacity of human resource development raised by this project has been maintained and used.

All the equipment provided by this project including the equipment at the Ho Chi Minh branch office, with the exception of some of equipment that had completed its role and was no longer in use, was in an appropriate state of management and operation. This was confirmed by the questionnaire given to the IET to check the usage status, and the direct observation done during this evaluation.

As described above, the technical foundations created by the project are firmly in place. On top of these is a need for skills and knowledge of a higher level or wider-range. At the time of this evaluation, the primary need voiced in the interviews of the IET was for environmental assessments, knowledge and skills related to the analysis of damages to health, techniques in the analysis of heavy metals, and for diverse techniques in wastewater treatment.

3.4.4 Financial Aspects of the Implementing Agency

The 2007–2011 income and expenditure data available at the time of this evaluation study is as follows.

Table 2: Balance of the IET's Income & Expenditure

	2007	2008	2009	2010	2011
1 Total Income	18,478,766,942	18,834,502,818	26,994,621,717	40,523,308,493	40,101,775,118
1.1 Government Financial Aid	11,050,588,090	10,279,172,639	13,422,242,496	17,632,949,135	17,072,853,154
1.2 External Income	7,428,178,852	8,555,330,179	13,572,379,221	22,890,359,358	23,028,921,964
2 Total Outgoings	18,427,456,091	18,824,264,657	26,972,381,732	40,498,180,049	40,080,885,618
2.1 Personnel	8,500,232,793	8,663,871,296	12,417,525,990	19,045,954,992	18,647,325,430
2.2 Materials & Equipment for Analysis	7,945,869,785	8,098,836,212	11,607,687,338	18,032,872,279	17,644,781,052
2.3 Operation/ maintenance of analysis instruments and facilities	923,938,347	941,725,141	1,349,731,086	1,418,315,797	1,604,071,005
2.4 Miscellaneous	1,057,415,166	1,119,832,008	1,597,437,318	2,001,036,981	2,184,708,131
3 Income & Expenditure (1-2)	51,310,851	10,238,161	22,239,985	25,128,444	20,889,500

Source: IET

Income continues to increase stably after the completion of the project. In particular, from 2009 onwards, external income exceeded government aid, and this increasing trend is favorable. The necessary expenditure of analysis operations is also stable, and it can be said that there are no problems in financial sustainability.

From the above, in relation to the IET's activities for research and development and human resource development in the field of water environment protection, no major problems have been observed in the policy background, the structural, technical, financial aspects of the executing agency, therefore, sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed at creating a research base in Vietnam through improvement of technical capacity of IET with relation to water environment protection administration, and expected to contribute to betterment of water environment protection in Vietnam including the establishment of a national water quality monitoring system. At the time of planning the project, IET was expected to be responsible for giving technical recommendations to the government authorities for establishment of the monitoring system water quality. However, after the commencement of the project, the project staff members found serious difficulties to realize the original target, and strategic direction of the project needed to be reconsidered to be more realistic. As a result, while maintaining the effort to contribute to the establishment of the water quality monitoring system as much as possible, more emphasis was put on human resource development for local government agencies and research and development of more advanced technical areas. Despite this redirection of the project, the important conditions including high priority of water environment management for the Vietnamese government, existence of high demand for improvement of water quality and water quality protection, and also the reasonable

development approach that IET, a research institute with comprehensive capability for environment management technologies, takes a role to disseminate appropriate technologies for water quality monitoring and wastewater treatment to local organizations through its branch laboratories are still maintained, therefore, relevance of the project is high.

Although the first part of the original Project Objective of contribution to the establishment of the monitoring system was not achieved, dissemination of relevant technologies was achieved, and impact was also partly achieved, therefore, the effectiveness is fair.

While the results of the experts dispatched and equipment provided exceeded the plan, this does not present a problem as there is a rational explanation for the additional input. Although the actual cost could not be compared with the budget plan, increase in the long-term experts and the equipment provision most likely made the total cost exceed the plan. Therefore the efficiency of the project is fair.

Financial and technical sustainability of the project effect was found good. After the revisions to the project design in respect to IET's position and roles for development of water environment management in Vietnam, there are sound environment surrounding the IET to continue its effort to develop and disseminate appropriate technologies for water environment management and to make contribution to policy formulations. Also, IET's organizational structure and its finances are stable enough. Therefore the sustainability of the project effect is high.

While this project displayed an insufficient effect for establishment of a national water quality monitoring system, which is a priority of the original plan, considered the real expectations to IET that it should provide necessary technical support to capacity of water environment management capacity of relevant organization in Vietnam, this project has accumulated effects.

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

4.2 Recommendations

4.2.1 Recommendations to Executing Agency

(1) Clarifying the Position and Roles of the IET

In terms of the IET's position and roles, the IET's annual report should specifically describes the IET as a neutral research institution responsible for the development and proliferation of primarily the latest technology within the field of the water environment; based on this, the IET is to formulate technical recommendations, and provide technical support to related parties directly responsible for activities related to water environment protection such as the DONRE and private sector corporations. Consensus on this IET's roles and position should be created among the related organizations including MONRE, and collaborations among them should be further promoted. CEM, CECT and research institutes of universities perform activities similar to a part of IET's activities, however, their activities are generally for standardization and/or dissemination of ordinal technologies. IET has been working for practical application and/or dissemination of a wider range of and more advanced technologies.

(2) Maximizing the Potential of the IET's Branch Offices

In order to expand the functions of the IET including formulation of proposals related to the latest technologies of water environment management, provision of technical consulting services and human resource development, it is necessary to further enhance technical capabilities and forge relations with all concerned parties in each region throughout the country

so that every branch office can provide them with a level of service equaling that of the Hanoi headquarters. In addition, it is necessary to enhance a technical backup system at the headquarters to handle situations which are over the current capacity of the branches, such as conduct of analysis using advanced technologies or require equipment only available at headquarters. Phase 2 of this project supported strengthening of the network of IET headquarters and the branches for the better technical services, and this effort should be further continued.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

The lessons learned from the project are as follows.

(1) Foresee of the Contribution of Research Projects to Development Administrations

When carrying out cooperation related to technical development and technical improvement, the counterpart implementing agency not infrequently becomes the highest repository of that technical field in the recipient nation. However, there are frequent problems in using the administrative system and policies to effectively utilize the technologies developed or transferred by the project. Therefore, if a project is aiming at actual use of the developed or transferred technologies for policy making and administration, clarification of the position of the target research institute in the policy making process, and incorporation of necessary activities into the project to secure a practical and firm linkage between the research institute and the administrative organization, is significantly important. Types of contribution by a research institute to the policy making and administration can vary: not only direct involvement to policy formulation, but also submission of proposal and recommendations, participation to relevant task forces, acceptance of contract work, support through human resource development, and so on. In any cases, taking a good consideration of the real roles and position of the research institute, project planner should formulate a realistic and not overambitious plan. Then, flexible management responding to the realities during implementation of the project is the key to a successful project and achievement at the level of the Overall Goal.

(2) Official Record of Adjustment of Development Scenario

In relation to the above, the direction of the IET's contribution was revised partway through the project. However, this point was not recorded in the official documents related to the project, and it took time to confirm the fact during this evaluation work. Phase 2 of this project reflected this revision of the project direction, but neither of terminal evaluation report of this project nor any project documents of the phase 2 explains how the project members considered the roles and position of IET among other relevant organizations and how they reached the revision of the project strategy.

While recognizing that planning always stands on hypotheses, changes to the environment and planning alterations due to unexpected circumstances arising after starting the project have to be taken into consideration and thoroughly documented, and it would be easily recognized whether the project would have been managed properly. Especially when a project is designed to be three years period, JICA does not conduct an official mid-term review and importance of

intentional consensus formation on such strategic changes is very significant. Therefore, proper documentation and filing so that anybody who needs to understand the situation can see the information is important. This is also crucial to ensure transparency and establish accountability.

(3) Proper Management of Budget Based on Clear Cost Projection

No figures for cost estimates at the time of planning could be obtained. In case of this project, additional long-term experts and equipment were procured in the course of the project implementation based on identified needs found after the commencement of the project. According to the Japanese experts and JICA advisory committee members, there were very good reason for each additional input, and addition of inputs itself is not a matter if there is a reason. The issue here is that budget management should be done based on plan-actual comparison, and any additional input should be examined from their necessity and acceptable limit of deviation from the original budget plan. In this case, no document showing how the examinations were done was provided, and it caused the difficulty to analyze and make judgment of the efficiency.

It is very important to properly file a budget plan and manage the change records.