Ex-Post Project Evaluation 2010: Package II - 6 (Vietnam)

October 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

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Preface

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

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2008, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2007. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

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

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

October 2011
Masato Watanabe
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

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

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

Secondary Evaluation Report on Tan Son Nhat International Airport Terminal Construction Project in the Socialist Republic of Vietnam

Keishi Miyazaki, OPMAC Corporation

Profile of the Project for the Primary Evaluation

Title	Tan Son Nhat International Airport Construction Project
Objective	To meet the increasing traffic demand and to improve the convenience and efficiency of the airport users by constructing a new international passenger terminal building with associated facilities, thereby contributing the socio-economic development of Ho Chi Minh City (HCMC) in particular and the entire Vietnam in general.
Loan Amount Approved / Disbursed	22,768 million yen / 22,155 million yen
Loan Agreement Date	March 29, 2002
Completion Date	July 2007
Executing Agency	Southern Airport Corporation (SAC) (former Southern Airport Authority: SAA), Civil Aviation Administration of Vietnam

Profile of the Primary Evaluation

Type of Evaluation	Ex-post evaluation
Evaluators	Vietnamese Primary Evaluation Team for Tan Son Nhat International Airport Construction Project (Ministry of Planning and Investment, Ministry of Transport, Civil Aviation Administration of Vietnam, Southern Airport Corporation and evaluation consultants)
Period of Evaluation	January – July 2011 (Fieldwork: March 2011)
Evaluation Rating	Highly satisfactory (A) with sub-ratings of relevance=high (3), efficiency=high (3), effectiveness with impact=high (3), and sustainability=high (3)

1. Framework of Secondary Evaluation

1.1 Background and Purpose of the Secondary Evaluation

This secondary evaluation is part of the Vietnam-Japan Joint Ex-post Evaluation Program, collaboration between Ministry of Planning and Investment (MPI) and Japan International Cooperation Agency (JICA) for evaluation capacity development in Vietnam. Every year since the Program started in 2007, a couple of Japanese ODA loan projects have been evaluated in their ex-post stages by project-wise joint evaluation teams consisting of the Vietnamese and Japanese evaluators. Year by year, the responsibility on the Vietnamese side has become larger. In JFY2010, evaluation ownership was further transferred to the Vietnamese side, which is now expected to plan, manage, implement and use evaluations on their own, by introducing the two-step evaluation as follows:

STEP 1 - Primary evaluation conducted by the Vietnamese evaluation team consisting of project-related organizations and external evaluators (national consultants) with guidance and suggestions by the Japanese secondary evaluator; and
STEP 2 - Secondary evaluation or evaluation of the primary evaluation. Secondary evaluation is conducted by the Japanese secondary evaluator.

There are two major purposes of the secondary evaluation:

(1) Evaluation capacity development of the Vietnamese government officials and consultants through verification of their evaluation process and reports; and
(2) Ensuring JICA's accountability by validating the evaluation judgment made in the primary evaluation from the viewpoint of the JICA's evaluation criteria.

1.2 Scope of the Secondary Evaluation

The object of this secondary evaluation is the ex-post evaluation of Tan Son Nhat International Airport Construction Project, the primary evaluation.

1.3 Methodology[1]

To serve the above purposes, the secondary evaluation was designed to answer the two major evaluation questions:

(1) Is the process and results of the primary evaluation good? (quality control)
(2) Is the evaluation judgment valid considering the evidence presented? (accountability)

For the quality control, the secondary evaluator reviewed the process and report of the primary evaluation based on a pre-defined checklist. For validation of the evaluation judgment, the secondary evaluator reviewed the findings presented in the primary evaluation report in the light of the JICA's evaluation criteria and sub-criteria for Japanese ODA loan and grant projects. For these purposes, the secondary evaluator joined the primary evaluators on meetings to design and process the primary evaluations as well as the field trip.

The secondary evaluator reviewed the primary evaluation report twice -- the first draft and final draft -- and shared the review results with the primary evaluation team, which then improved the quality of the draft.

Checklist for Quality Control of Evaluation Process and Results

I Evaluation Process	**1. Schedule, Budget and TOR** (1) Appropriate scheduling, (2) Adherence to schedule, (3) Budget, (4) Adequateness of TOR, (5) Adherence to TOR
	2. Evaluation Design (1) Logic model, (2) Evaluation questions, (3) Data collection, (4) Information and data management
II. Evaluation Report	**3. Background** (1) Evaluation purpose and methods, (2) Evaluators, (3) Necessity of Project, (4) Output, outcome and impact
	4. Evaluation on Relevance Quality of the report: (1) National development strategy (2) Sector policy, (3) Comparability, (4) Development needs, (5) Japanese ODA policy Comments on Value Judgment
	5. Evaluation on Efficiency Quality of the report: (1) Details of output, project period and project cost, (2) Output, (3) Project period, (4) Project cost Comments on Value Judgment
	6. Evaluation on Effectiveness Quality of the report: (1) Evidence, (2) Selection of evidence, (3) Reasons, (4) IRR Comments on Value Judgment

[1] References: JICA References on Ex-post Evaluation; Western Michigan University, Evaluation Checklists (http://www.wmich.edu/evalctr/checklists/); Secondary Evaluation by the Advisory Committee on Evaluation (http://www.jica.go.jp/english/operations/evaluation/reports/2007/pdf/2007_04_01.pdf)

	7. Evaluation on Impact Quality of the report: (1) Evidence, (2) Beneficiary, (3) Environment, (4) Land acquisition and resettlement Comments on Value Judgment
	8. Evaluation on Sustainability Quality of the report: (1) Institutional arrangement, (2) Staffing, (3) Technological level, (4) Source of O&M budget, (5) Amount of O&M cost and O&M budget, (6) Maintenance activities Comments on Value Judgment
	9. Conclusion, Recommendations, and Lessons Learned Quality of the report: (1) Representation, (2) Feasibility of recommendations, (3) Concreteness of recommendations, (4) Relevance of recommendations, (5) Feasibility of lessons learned, (6) Relevance of lessons learned
	10. Overall Quality of the report: (1) Consistency across sections, (2) Data table, graph and photos, (3) Data source, (4) Description of social survey, (5) Limitation of the evaluation, (6) Deviation from rating criteria, (7) Protection of personal information

1.4 Constraints and Limitation of this Secondary Evaluation

None.

2. Evaluator

Keishi Miyazaki, OPMAC Corporation

3. Summary of the Primary Evaluation Results by Vietnamese Evaluation Team

(1) Relevance. 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.

(2) Efficiency. Both project period and project cost were mostly as planned/ within the plan, therefore efficiency of the project is high.

(3) Effectiveness. This project has largely achieved its objectives, therefore its effectiveness is high. Since it started operation in 2007, Tan Son Nhat Airport International Terminal has responded positively to the increasing demand of international travel of Vietnamese and foreign passengers. The volume of passengers traveling in and out Vietnam through TSN International Airport was recorded at 7,025,398 in 2010, which was 31% higher than the projected volume of 5,362,000. The annual average growth rate of number of passengers traveling through TSNA International Terminal between 2007 and 2010 was 15%whih was also higher than estimated at the time of feasibility study (i.e. 14.2%). The number of international flights at TSN International Airport was recorded at 44,140 in 2010, increased by 11,400 flights/year in comparison to 2005.

Not only the handling capacity of the airport was improved after the project, convince for the airport users was also improved. The types of non-aviation services provided and number of service providers at TSN International Airport increased remarkably. According to the results of beneficiary survey to the passengers (total 123 respondents), most of the passengers were satisfied (48%) and highly satisfied (39%) with the airport facilities. In addition, the security of the airport was improved by modernization of the security devices such as scanning machines and magnetic gates. The financial internal rate of return was re-calculated to be 24.1%, which

was higher than the calculation in the appraisal (7.1%). Similarly the economic internal rate of return was re-calculated to be 35.9%, which was higher than the calculation in the appraisal (19.1%).

(4) Impact. A number of positive impacts were observed. They were (i) financial contribution to the state budget and revenue of HCMC through tax payment, (ii) impact on improved accessibility in the urban transport network, (iii) impact on promoting of economic development in HCMC in general and the tourism sector in particular, and (iv) contribution to the development of aviation sector in Vietnam.

Regarding the environment impact, the results of environment monitoring on the air quality inside and around the airport, noise level, water quality in and around the airport's waste water treatment facility says that they were within the permitted level against the Vietnamese environmental regulation and standards.

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

(6) Conclusion. In the light of the above, this project is evaluated to be (A) highly satisfactory.

(7) Recommendations. SAC should effectively cooperate with the People's Committee of Ward 2 of Tan Binh district, and concerned authorities of HCMC such as Department of Transportation, Traffic Police Force and many other concerned agencies to regulate and monitor the operation of taxi companies in and outside the airport area.

(8) Lesson learned. (i) working safety should be strictly monitored and enforced, (ii) when the O&M agency of the project directly involves in the project implementation, this practice generates a number of advantages including the capacity development of staff and promotion of accountability, and (iii) creating fair competition environment would ensure the quality of services.

4. Summary of the Secondary Evaluation Results and Recommendations

As the primary evaluation satisfied most of the check points, the evaluation process and the quality of the report are evaluated as satisfactory. In the draft primary evaluation report, there were rooms for improvement in some aspects such as modification of the chapter of relevance, efficiency, lessons learned and schedule control of the evaluation process, but these issues were settled in the course of finalization process of the primary evaluation report.

The value judgment made in the primary evaluation is valid considering the evidence. Therefore, the evaluation rating results judged by the primary evaluator (i.e. Overall rating: Highly satisfactory (A) with sub-ratings of relevance: high (3), efficiency: high (3), effectiveness with impact: high (3), and sustainability: high) are reasonable and acceptable.

5. Analysis of Process and Report of the Primary Evaluation

Verification of the Evaluation Process

5.1 Schedule, Budget and TOR

The brief overall evaluation schedule was drafted by the Japanese secondary evaluator, and the Vietnamese primary evaluation team refined it and prepared a detailed work plan with interim deadlines in each step of evaluation. The overall period of the primary evaluation was

approx. eight months from November 2011 to July 2011. Although enough time was allocated for the primary evaluation, interim deadlines were sometimes not kept due to overload of team members.

The cost for the primary evaluation was shared by the Japanese side (remuneration for consultants, cost for trainings, meetings and workshops, vehicles during the field work) and the Vietnamese side (travel expenses for trainings, meetings, workshops and fieldwork). There was no major problem in the amount of the budget for conducting the primary evaluation.

As mentioned above, the Vietnamese evaluation team was supposed to manage, not only implement, the primary evaluation. TORs were prepared separately for the "management team" and the "implementation team", the newly-introduced sub-division of the Vietnamese evaluation team in response to the increased tasks on the Vietnamese side. The TOR for the implementation team was clear for both the government members and consultants, while the TOR for the management team was not fully understood by some members from the government (i.e. they interpreted that the only task for the management team was to attend a few workshops and acknowledge the draft evaluation report, while there were many other tasks of schedule and quality control had been assumed). This was possibly because evaluation management was still new in Vietnam, though the legal framework (such as No. 131/2006/ND-CP) provides outsourcing of project evaluation to external evaluators. However, the coordination between the management team and implementation team was comparatively better than the hydropower team[2] because an evaluation advisor of MOT was acting as a representative of the management team in case of Airport team.

5.2 Evaluation Design

At the beginning of the evaluation design, the primary evaluation team developed the logic model of the project. Then, they identified evaluation questions and data collection strategy to answer each question in a format of evaluation planning framework.

In the first draft of their evaluation planning framework, there was some confusion in logical sequence between goal, purpose and outcome and setting up their appropriate indicators. Later, the problem was fixed and the logic model improved much to a sufficient level. Likewise, the evaluation questions became more to the point as they repeated discussions and with suggestions from the secondary evaluator.

Data sources were very detailed and realistic because the team consisted of members who have been involved in the project implementation or knew well about it. This is an advantage of this kind of (partial) internal evaluation. In addition, the team deployed a wide range of data collection tools such as a questionnaire survey to project related agencies and local government, a beneficiary survey (semi-structured interview survey) to the airport users including 123 passengers and 53 staff/companies working in the airport, focus group to local community.

Verification of the Evaluation Report

5.3 Background

The format of the primary evaluation report was taken from that of JICA project evaluation, which does not have distinct sections on evaluation purposes and methods in individual reports (instead, JICA includes them in its annual evaluation report as common information to all project evaluations). If the Vietnamese side is to publicize the primary evaluation reports as a stand-alone document, the evaluation purposes and methods should be added to the report.

[2] In parallel with the primary evaluation of Tan Son Nhat International Airport Construction Project, Dai Ninh Hydropower Project (1)(2)(3) was evaluated by the Vietnamese Primary Evaluation Team for Dai Ninh Hydropower Project (i.e. hydropower team) consisted of the representatives from Ministry of Planning and Investment, Ministry of Industry and Trade, EVN, Project Management Board No.6 of EVN, Dai Ninh Hydropower Company of EVN, and evaluation consultants.

Other essential background information such as the evaluators as well as the project outlines are all presented in the report.

5.4 Relevance

The relevance section is satisfactory.

In the policy aspect, the report shows relevant sections of the Socio-Economic Development Plans and Master Plans for Civil Aviation at the times of both ex-ante and ex-post evaluations as the development policies that have supported the project.

In the needs aspect, the report shows the necessity of the project referring the trend of international and domestic passenger demand as well as the role and status of Tan Son Nhat International Airport in the civil aviation sector in the southern Vietnam before and after the project, which indicates the continuing needs for airport sector development.

5.5 Efficiency

The efficiency section is satisfactory.

The description of the outputs and inputs (project period and project cost) is precise and the reasons for differences between "Plan" and "Actual" explained appropriately.

5.6 Effectiveness

The effectiveness section is satisfactory.

The report appropriately presents the evidences such as no. of passenger, no. of flights, no. of non-aviation services and beneficiary survey results to the airport users which are direct and valid in verifying the intermediate outcomes.

The report also clearly explains reasons for an increase/decrease in each outcome indicators (e.g. a creating a fair competitive environment by SAC as an influencing factor to improving quality and quantity of non-aviation services).

The re-calculation of financial internal rate of return (FIRR) and economic rate of return (EIRR) comparison of it with the planned value is well presented with the appropriate reasons for the differences between the planned and re-calculated value.

5.7 Impact

The efficiency section is satisfactory.

The evidences the evaluation team selected (i.e. tax revenue from the airport, connectivity in urban transport network, GDP growth, No. of FDI, No. of tourist, revenue from tourism sector, etc.). The evaluation team tried to grasp the cause and effect relationship between the socio-economic impacts and the project such as (i) tax contribution to HCMC, (ii) improvement of connectivity in urban transport network, (iii) promoting economic activities in HCMC in general and in tourism sector in particular, and (iv) development of aviation sector in Vietnam from the different angles and perspectives referring the statistical data, the official documents, key informant interview results, and geographic atlas. Even though the report could only tell the project partially contributed to the observed positive changes (i.e., analysis of attribution is difficult within the framework of this joint evaluation) except the impact of (i) tax contribution to HCMC, the evidences are valid to assess the intended impact of this project.

The beneficiary of this project is clear from the report; the first direct beneficiaries of this project are airport users such as passengers and companies, organization and staff who are engaged in the airport. But in a broader sense, the beneficiary can be expanded to HCMC and the southern region of the country.

Regarding the environmental impact, the comprehensive environmental monitoring results together with respective environmental parameters in comparison with the Vietnamese standard

are well presented. Also the results of focus group and interview to the local community regarding the noise issue are presented.

Since there was no land acquisition and resettlement in this project, the land acquisition and resettlement issues is not examined in this report.

5.8 Sustainability

The sustainability section is satisfactory.

The report clearly states the organizational setting for operation and maintenance of the facilities built by the project. The evaluation of technical levels of operation and maintenance staff is relevant with the information on technical capacity of affiliated company of SAC in charge of O&M of the project facilities.

Regarding the financial aspect, the source of O&M budget (revenue from the airport) is explained together with the O&M cost, but according to the estimation by SAC, the sustainability of securing the O&M budget seems to be no major problem.

Maintenance activities are described by types of airport terminal facilities with the information of responsible names of sections, department and affiliated companies. Also the report mentions that the O&M activities are conducted in compliance with the SAC manuals.

5.9 Conclusion, Recommendations and Lessons Learned

A recommendation addressed to SAC is clear understandable which is supported by the evaluation findings presented in the main body. If the time frame for realising the contents of recommendation can be set, this recommendation will be easier to monitarable.

The lessons learned for "Working safety" is too general and difficult to replicate to other projects. It requires further analysis on why such strict safety regulation was able to be applied to this project, what type of safety measures and procedures were taken in this project, and whether the same safety condition is applicable to other projects, etc. The other two lessons are detailed and may provide a useful implication to the other projects.

Lastly, there is a difference in the concepts of recommendations and lessons learned between what they are written in the primary evaluation report and the JICA's reporting guideline of ex-post evaluation. According to the JICA's guideline, the recommendation is a suggestion for this project (i.e. target project evaluated) and the lessons learned is a suggestion for other project. However, the secondary evaluator accepts the way of recommendations and lessons learned in the primary evaluation report as long as their suggestions are reasonable and relevant.

5.10 Overall

The information in background, body sections, and a comparison table (attached to the end of the report) are consistent. Data tables, graphs and photos clearly support the argument. The value judgement for each evaluation criteria is appropriately done with the support of evidences.

6. Satisfaction of Vietnamese Government on Special Yen Loan[3]

6.1 Ministry of Transport (Line Agency of the Project)

(1) Selection of Contractors and Project Costs

MOT answered that (i) the number of participants for Pre-Qualification and bidding process for the contracts of the project was smaller than expected in comparison with the similar project and (ii) the lowest bid price over officially approved cost estimate ratio was larger than normal case in Vietnam. They were because of the following conditions of Special Yen Loan: (a) the condition of tying to Japanese contractor limited the choice of the qualified contractors, (b) the condition of tying to Japanese contractor limited the price competition, and (c) the condition of minimizing procurement from Japanese origin pushed up the price. MOT addressed the necessity for relaxing the condition of minimizing procurement from Japanese origin for the future project under the Special Yen Loan scheme.

(2) Quality of Contractors

Regarding the level of quality of the prime contractor, the evaluation of MOT was (i) fully satisfied with the schedule management, (ii) significantly satisfied with technological quality, (iii) significantly satisfied with overall project management, and (iv) fully satisfied with structure and facilities constructed under the project. Also MOT was significantly satisfied with the level of technical, implementation, operation and maintenance capacity of the sub-contractors.

7. Attachment

Primary Evaluation Report on Tan Son Nhat International Airport Construction Project

[3] This project was implemented utilizing the Special Yen Loan (SYL). SYL was introduced by the Government of Japan in 1998 as one of the financial relief measures for Asian countries suffered from the Asian economic crisis. SYL was to provide concessionary financial assistance for the development of infrastructures in the fields of transportation logistics, foundation for productive facilities and large-scale disaster prevention. The terms and conditions of SYL is set at greater concessionary level than standard terms and conditions of ODA loans, while the eligibility of the prime contractors under SYL is limited to Japanese nationals or judicial persons and procurement of goods and services under SYL is tied to Japanese goods and services (goods and services whose country of origin being other than Japan can be procured up to no more than 50% of the total loan amount).

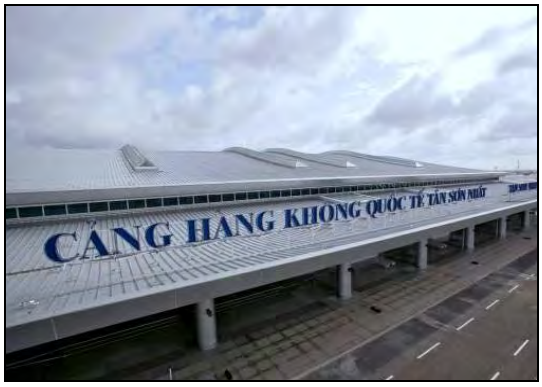
Viet Nam

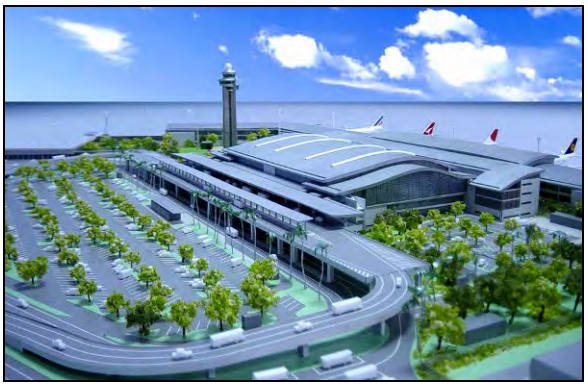
Ex-Post Evaluation of Japanese ODA Loan

"Tan Son Nhat International Airport Terminal Construction Project"

Evaluators: Vietnam-Japan Joint Evaluation Team 2010 (IP2010)

1. Project Description





TSN Airport International Passenger Terminal

1.1 Project Outline

Tan Son Nhat (TSN) International Airport was built under the French colonial time with only one north-south runway. Before 1975, the USA expanded the airport with two runways (each of those had a length of approximately 3,000 meters, laying east-west direction). At that time, the airport was mainly for military purposes.

Since 1975, after a long time of utilization, expansion and improvement, the total area of TSN terminal building was approximately 30,000m^2 by 2000 with its handling capacity of 5 million passengers per year. During that time, TSN airport met traffic demand of Ho Chi Minh City (HCMC), and was an important gateway to southern region of Vietnam.

However, with the increasing number of passengers and cargo through TSN airport, especially with the increasing number of international passengers, which is expected to reach 5 million in 2010 and 9.4 million in 2020, a new international terminal building becomes a urgent requirement. "The Feasibility Study on International Passenger Terminal Area Development Project in Tan Son Nhat International Airport" was implemented by JICA in March 2000.

1.2 Project Objectives

The objective of the "Tan Son Nhat Airport International Passenger Construction" project is to meet the increasing traffic demand and to improve the convenience and efficiency of the airport users, being capable to receive 8.3 million passengers in 2010 and 15.5 million passengers by 2020, by constructing a new international passenger terminal building with associated facilities at the Tan Son Nhat Airport, thereby contributing the socio-economic development of Ho Chi Minh City (HCMC) in particular and the entire Vietnam in general.

Table 1: Logical Framework Applied for Ex-Post Evaluation

Goal	▪ To contribute to the socio-economic development in HCMC and in Vietnam ▪ To contribute to the development of the aviation sector in Vietnam
Purpose	▪ To meet the increasing demand trannsportation through TSN International airport ▪ To improve the covenience and efficiency of the airport users
Outcomes	▪ Increased number of passengers travelling through Tan Son Nhat international airport ▪ Increased handling capacity of the terminal ▪ Increased the variety of services provided at the terminal by other service providers ▪ Increased number of airlines using TSN Airport
Outputs	▪ International passenger terminal building: ▪ Civil work: ▪ Special equipments: ▪ Airport utilities: ▪ Aircraft fuel hydrant system: ▪ Consulting services ▪ Auditing service
Inputs	▪ Total cost: 26.786 Mil. Yen ▪ ODA loan (Loan agreement No.VNIX-2): 22.768 Mil. Yen *In which:* • *JPY portion: 18.345 Mil. Yen* • *VND portion: 8.441,6 Mil. Yen (equivalence)* ▪ Counterpart fund: 4.018 Mil. Yen (based on June 2001)

Table 2: Summary of Project description

Approved Amount/Disbursed Amount	22,768 mil. JPY / 22,155 mil. JPY
Exchange of Notes Date/ Loan Agreement Signing Date	29/3/2002
Terms and Conditions	▪ Interest rate: 0.95% p.a (0.75% p.a for Consulting services) ▪ Repayment Period: 30 years ▪ Grace Period: 10 years ▪ General Tied
Borrower / Executing Agency(ies)	The Goverment of Socialist Republic of Vietnam / Civil Aviation Administration of Vietnam / Southern Airports Corporation
Final Disbursement Date	July 2008
Main Contractor (Over 1 billion yen)	JV: Kajima-Taisei-Obayasi-Maeda (KTOM)
Main Consultant (Over 100 million yen)	Japan Airport Consultants, Inc.
Feasibility Studies, etc.	"The Feasibility Study on International Passenger Terminal Area Development Project in Tan Son Nhat International Airport" by Japan Airport Consultants, Inc. March 2000.
Related Projects	None

2. Outline of the Evaluation Study

2.1 Evaluators

The Vietnam-Japan Joint Evaluation Team 2010 consisted of two Working Groups, each of which evaluated different projects. This project was evaluated by the Airport Group. Dut to the design if this IP2010, in each Group, there are two sub-groups/teams including the Management Team and the Implementation Team, as following:

Management Team

1	Trần Tường Lân	Ministry of Planning and Investment
2	Nguyễn Ngọc Hải	Ministry of Transport
3	Đỗ Tất Bình	Southern Airports Corporation
4	Cao Mạnh Cường	Ministry of Planning and Investment
5	Nguyễn Dương	Civil Aviation Administration of Vietnam

Implementation Team

1	Trương Quang Hưng	Ministry of Planning and Investment
2	Đỗ Đức Tú	Ministry of Planning and Investment
3	Cao Thanh Phú	Ministry of Planning and Investment
4	Nguyễn Công Hoàn	Southern Airports Corporation
5	Võ Toàn Thắng	Southern Airports Corporation
6	Đoàn Nhã Trúc	Southern Airports Corporation
7	Trần Thị Thu Hà	Southern Airports Corporation
8	Nguyễn Trường Thi	Southern Airports Corporation
9	Đinh Xuân Trí	Southern Airports Corporation
10	Nguyễn Thị Hồng Thúy	Civil Aviation Administration of Vietnam
11	Trần Lê Trà	National consultant / PeaPROs
12	Lê Quang Trung	National consultant / PeaPROs

2.2 Duration of Evaluation Study

- Duration of the Study: from November 2010 to July 2011
- Duration of the Field Study: March 2011

2.3 Constraints during the Evaluation Study

- The Project Completion Report (PCR) was not prepared at the time of ex-post evaluation.
- At the end of the collecting information field study, end of April 2011, the data of passengers by the purposes of travelling (tourist, trade, other) was not ready by the Immigration police.

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

3.1 Relevance (Rating: 3)

3.1.1 Relevance with the Development Policies of Viet Nam and Ho Chi Minh City (HCMC)

At the time of project appraisal, Resolutions of the Party's Central Committee VIII and IX on social-economic development and international integration; National Development Strategy 2001- 2020 emphasized: "Development of infrastructure, including the infrastructure for transportation, is in the highly prioritized list of the country". The Resolutions are now still applicable.

SEDP (2001-2005) also set a target "Increase economic development investment capital... gradually improve infrastructure systems... strengthen the State corporations as a base for the powerful economic groups in some sectors of the national economy such as telecommunication, aviation, petrol...". At the time of evaluation, the SEDP 2006-2010 stated: "Establish new towns and highways, and … modernize international airports… in the Southeasten region."

In addition, during project implementation, SEDP 2006-2010 of Ho Chi Minh city, considered as the guidelines for city development, highlighted: "Strong improvement of investment environment; Strengthen capacity for attracting FDI, Development of Southern Economic Zone; Improvement of transportation infrastructure".

In terms of consistency with sectoral development strategy, at the time of appraisal, Decision 911/TTg dated 24/10/1997 indicated: to the year 2000, upgrade and modernise the International Airports of Noi Bai, Da Nang and Tan Son Nhat. At the time of evaluation, Decision 101/QD-TTg (dated Jan 22, 2007) of the Prime Minister on Master Plan for Transportation of HCM City to 2020 and beyond also stated: "Modernize the city's network of transportation (roads, marine lines, railways, airways), ensuring the city's stable and balanced development, making HCM city a national socio-economic development center, a key factor for the development of the southern economic zone and a trading and service center of ASEAN".

Decision 21/QĐ-TTg (dated Jan 08, 2009) on Master Plan for the development of Civil Aviation to 2020 and Vision to 2030 determined:

- Develop aviation infrastructure, focusing on advanced technology.
- Network of airports:
  - ***To 2020****: Develop the network of airports with Hà Nội, Đà Nẵng, Hồ Chí Minh city as the 3 most important points for domestic and international aviation transportation.*
  - ***To 2030****: Continue to develop the existing airports, especially the 10 international airports (Nội Bài, Cát Bi, Phú Bài, Đà Nẵng, Chu Lai, Cam Ranh, Tân Sơn Nhất, Long Thành, Cần Thơ, Phú Quốc)*

As planned, TSN International Airport plays the central role for international and domestic aviation transportation of the southern region, and reaches Level 4E (ICAO standard): accommodating B747-400 or equivalent; its capacity reaches 17 million passengers per annum and 300,000 tons of cargo per annum by 2015.

Prime Minister's Decision 589/QD-TTg (dated May 20, 2008) on regional planning of HCMC until 2020 and beyond clearly stated that the "TSN international airport in 2020 will be the global and regional airport hub, which should be upgraded by 2010 to receive 9 million of passengers, and by 2020 to receive 20 million passengers".

Besides, from now until the Long Thanh airport is completed, TSN airport will be upgraded to serve the expected 20-25 million passengers per year. According to the approved plan, Long Thanh will be operated in 2020. After 2030-2035, the opeation of TSN airport will be re-calculated and adjusted.

Therefore, the construction of TSN airport international terminal building is consistent with national development policy of Vietnam and HCMC.

3.1.2 Relevance with Development Needs of Passenger Aviation Transportation of Vietnam and HCMC

At time of project preparation, international passengers traveling to Vietnam was 1.8 million per year (1998), increased when compared to 1.6 million passengers in 1996, of which 62% immigrated through airport [1]. Passengers through the TSN international airport was expected to increase of 15% per year (see **Table 3**). By 2007-2008 the number of passengers would reach and exceed the maximum capacity of the old terminal (appx. 7 million passengers/year, including domestic and international passengers). In addtion, the aged facilities of the old terminal, some of those were installed since 1975, would need to be replaced to meet requirements of modern ones. Thus, the new terminal building is needed.

Table 3: Number of International and Domestic Passengers going through TSN Airport

Unit: 1,000 persons

Passenger		2001*	2005	2007	2008	2009	2010	2015	2020
International	Est		3,284	4,231	4,828	5,077	5,362	6,973[i]	9,380[i]
	Est. by SAPROF [03/2001]		3,284	3,996	4,407	4,861	5,362	6,973	8,962
	Act	2,557	4,312	5,603	6,068	5,943	7,025	10,198[ii]	14,579[ii]
Domestic	Est		2,620	3,068	3,292	3,483	3,740	5,111[i]	6,413[i]
	Act	1,760	3,033	4,684	5,658	6,787	8,031		

Source: Southern Airpot Corporation (SAC), F/S

Note:

- Est.: Estimated number (in F/S); Act.: Actual number (SAC)
- * Project appraisal time (year)
- i: Estimated in F/S,
- ii: Re-estimated at 2010, based on updated conditions

At the time of evaluation, according to statistics from Southern Airports Corporation with passenger growth as at present, in the coming 2-3 years, TSN international airport is expected to reach its full capacity. Thus, the next phase is planning to expand the terminal to meet the transportation demand by 2020-2025. The terminal's facilities continue to be utilized for passengers. The demand for expanding TSN airport international terminal still remains high.

Thus, the construction of the TSN international terminal building is consistent with the development needs of Vietnam and HCMC.

3.1.3 Relevance with Japan's ODA Policy

At the time of appraisal, according to Japanese government aid policy, objectives for operations in Vietnam were (i) support for macro-economic stability, (ii) support for the transitional economy, (iii) support for economic infrastructure development, (iv) support for human resource development, (v) support for social issues and (vi) support for environmental protection. In particular, regarding (iii) support for economic infrastructure development, priority was given to the power, transport and environmental sectors.

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

3.2 Efficiency (Rating: 3)

3.2.1 Project Outputs

The main works of the project is the construction of the international passenger terminal,

[1] Final Report, Special Assisntece for Project Formation (SAPROF) for Tan Son Nhat International Airport Terminal Development Project, JBIC, 2001, p.25.

which was originally designed to be 75,000 sqm with associated facilities. Besides, there are other important works such as roads system, parking area, ground area, etc. Sets of equipments that support airport users, including passengers and people working in the airport, were purchased, installed and used. Besides, the project has built capacity for the operation and maintenance staff to improve the effectiveness and sustainability of the project. Most of the outputs, though having some changes in some work items, have been completed as planned. **Table 4** compares the outputs as planned and the actual output.

The floor area of the new international terminal is increased significantly. Together with an increase in floor area and number of floor, the amount of equipments and facilities is also increased. During the design stage, it was realized by actual situations that the volume of passengers has increased significantly compared to the estimation. Therefore, the terminal's design was changed to add one more mezamine and the wing-2 to the terminal to: i) increase the capacity of the airport terminal, ii) improve the smoothness of the passenger flows inside the terminal by separating departure and arrival flows of passengers, and iii) to eventually increase the commercial area for the terminal. The installation of the wing-2 resulted in the putting in additional 2 sets of passenger boarding bridges.

Considering the site clearance area, it is the fact that the land area is designated to the airport. Therefore there was no resettlement and compensation for land clearance has been made. Thus the difference in area only means the estimated and actual area of land that was clear. No compensation or resettlement has to be made.

Table 4: Comparison of Planned and Actual Outputs

Key outputs	Plan	Actual
1. Terminal facilities		
▪ Number of floors	3 floors	3,5 floors
▪ Total floor area	~ 75,000 m^2	93.000 m^2
▪ Area of Site clearance	150,000 m^2	129,000 m^2
2. Special equipments		
▪ Baggage handling system	2 sets	Same as planned
▪ Passenger boarding bridge	6 sets	8 sets
▪ Flight information display system	1 system	Same as planned
▪ Escalator	9 sets	18sets
▪ Elevator	14 sets	20 sets
▪ Security system		
▪ X-ray equipment	16 sets	Same as planned
▪ Arch-shape metal detector	10 sets	Same as planned
▪ Common use terminal equipment (CUTE)	1 system	Same as planned
3. Civil work		
▪ Road	~ 41,000 m^2	- Area of Road: 55.000 m^2 -Car park Area: 23.000 m^2 -Area of GSE lanes and parking: 13.000 m^2 - Viaduct: 10.540 m^2
▪ Car park	~ 34,000 m^2	
▪ Ground Service Equipments (GSE) lanes & parking	~ 32,000 m^2	
4. Aircraft fuel system		
▪ Pipes system	3,500m ĐK 14"	Same as planned
▪ Other system	06 tunnels with 27 valves controlled by motor	Same as planned

Key outputs	Plan	Actual
5. Airport utilities		
▪ Electricity supply	1 system	Same as planned
▪ Internal lighting	1 system	Same as planned
▪ External light	1 system	Same as planned
▪ Telephone	1 system	Same as planned
▪ Water supply o *water tanks* o *pumps* o *pressurized tank*		 - 2 sets - 4 sets - 2 tanks
▪ Clean water treatment system		1 system
▪ Waste water treatment system		1 system
▪ LPG system		1 system
▪ Solid waste treatment	N/A	N/A
▪ Other utilities (see attached file)		
6. Consultancy		
▪ Detailed design	Foreign: 116 MM Việt Nam (133+200)MM	Foreign: 128 MM VN: 117 MM
▪ Assistance in tendering	Foreign: 33 MM VN: (31+70) MM	Foreign: 21 MM VN: (7+32)MM
▪ Construction supervision	Foreign: 285 MM VN: (344+197) MM	Foreign: 378 MM VN: (398+437) MM
▪ Maintenance Supervision) (including environmental management and supervision during the warranty period)		Foreign: 33 MM VN: (25+49) MM

Consultancy works was also changed. Workload of consultancy service changed due to: i) the detailed design was package contract. Thus, the number of man-months could be changed, but the total contract value remained unchanged; ii) for the bidding process, because the Southern Airpot Corporation (SAC) supported to prepare bidding documents and procurement, the workload for procurement reduced, and iii) for construction supervision, the man-months was estimated, the paid workload was based on the actual work. According to the original design, maintenance supervision was not specifically determined and was only calculated for one year of 2007 after the completion of the project. In the implementation process, SAC signed a contract with consultants to perform this work in two-year warranty (2007-2009). The workload was calculated based on actual records.

It should be noted that during the implementation of the project, which was equivalent to 16 million hours of labour, there was no such serious accident that caused death or major enjury happened. That dued to the strict monitoring and application of labour safety regulation of all involved operational and management entities.

Following are selected pictures of the project, from construction period until the completion.

During the construction

8th Month _ Pic - 02 (Apr 2005)

8th Month _ Pic - 04 (Apr 2005)

After the project's completion

PTB (Exterior)

2F Check-in Lobby

2F Departure Concourse

CIP Lounge

Handicapped Users' Toilet

GF Baggage Handling Area

Chiller Room

LV Room

3.2.2 Project Inputs

3.2.2.1 Project Implementation Period

The project duration was defined as from the signing of the Loan Agreement to the date when three parties (Project Owner, Consultant, and Contractor) sign the Handover Minutes. The total actual project implementation was 64 months (from March 2002 to July 2007), which is only 5% longer than planned 61 months (originally planned from December 2001 to December 2006). **Table 5** below shows the major periods during project implementation.

Table 5: Comparison of Planned and Actual Project Implementation Period

Major works	Planned	Actual
Total project implementation	End of 2001 – 12/2006 (61 months)	3/2002 – 7/2007 (64 months)
Signing of L/A	Expected by 12 / 2001	3 / 2002
Selection of consultants	Begining 2002 – Mid 2002	3/2002 – 9/2002
Detailed design	Mid 2002 – Mid 2003	7/2002 – 9/2003
Selection of contractor(s)	Mid 2003 – Mid 2004	12/2002 – 8/2004
Construction works	Mid 2004 – 12/2006	8/2004 – 7/2007
Consultant services	Mid 2002 – 12/2006	9/2002 – 7/2009
Auditing	Not defined	2/2007 – 12/2007
Project completion*	12/2006	26/7/2007

Even though the project implementation period was three months (5%) longer than planned, the volume of works was significantly increased (e.g. the total floor area was increased from 75,000m2 to 93,000m2, equivalent to 24%). Therefore it can be said that the project could have been completed even earlier than planned if there was no such changes in the design and during the implementation.

During the project implementation, the Project Management Unit had requested the contractors to re-schedule all the remaining work items and commit to meet the approved time table.

Other work items were implemented in accordance with the original time frame. The project was slightly longer than planned.

3.2.2.2 Project Costs

The situations in reality show that the number of passengers going through TSN airport has increased much faster than previously forecasted. In order to meet the demands as well as creating more commecial areas for the airport, the terminal's design was changed to add one more mezemine and the wing-2 to the terminal. Also, additional equipments were added to ensure the proper and smooth operation of the terminal, to increase quality of services, and to ensure the security and safety of the terminal. In general, the quantity of the purchased packages remained unchanged. Only the quantity if items in each of the packages were increased.

There were differences between planned and actual costs due to the scope changes during the project implementation: increased floor area together with increased equipments. Besides, annual costs also differed by each year due to the changes in construction scope and in terms of implementation and disbursement rates of progress. The final payment settlement of the project took longer time than expected as the procedures must follow the government's regulations on approval of new unit rates, unexpected costs, and verification of other varriation work items.

During the project preparation stage, the estimation of the total investment was rough. After having the basic design, the employer (SAC) worked with the consultant to re-calculate the project cost items based on the updated quotations. Costs for each item were then re-calculated more precisely.

Table 6: Comparison of Planned and Actula Project Costs

Unit: Mil. JPY

Items	Plan						Actual					
	Foreign currency		Local currency		Total		Foreign currency		Local currency		Total	
	Total	ODA loan portion	Total	ODA loan portion	Total	ODA loan portion	Total	ODA loan portion	Total	ODA loan portion	Total	ODA loan portion
1. Construction and equipments	14,529	14,529	5,288	5,288	19,817	19,817	17,716	13,863	7,450	6,138	25,166	20,001
2. Contingency	1,453	479	529		1,981	479						
3. Consultant services	1,748	1,748	110	110	1,858	1,858	1,882	1,833	105	93	1,987	1,926
4. Audit services	9	9			9	9	5	5			5	5
5. Management			89		89				414		414	
6. Taxes and fees			2,427		2,427				672		672	
7. Interest (during construction)	605	605			605	605	223	223			223	223
Total	18,345	17,370	8,441	5,398	26,786	22,768	19,826	15,924	8,641	6,231	28,467	22,155

Source: SAC

Notes:

- For planned costs: Exchange rate (June 2001): USD1=VND14,600=JPY122 (VND1=0.00836)
- For actual costs: JPY 1 = VND 139.9 (average 2002-2008)

At the time of ex-post evaluation, the final payment settlement has not been completed. The consultant of the project has not issued final payment certification. Thus, the actual costs in this report are the estimated costs based on the final application for payment of the contractor. The planned cost of the project was 26,786 mil. JPY, in which Japanese ODA loan contributed 85% (22,768 mil. JPY), and the counterpart fund from the Vietnamese government contributed 15%. Project cost, estimated by the time of ex-post evaluation, was 28,467 mil. JPY, 6.3% higher than planned.

As analyzed above, the planned project outputs were realized with additional outputs and both the project duration and project cost were almost as planned. Therefore the efficiency is high.

3.3 Effectiveness (Rating: 3)

3.3.1 Quantitative Effects

Effort of the project in developing an international-standard terminal, including the expansion of terminal building, installation of operation equipments and facilities, and special equipments for passengers' comfortability etc… brings positive effects. Three direct outcomes of this project include: (i) to meet the increasing transport demand through TSN international airport and (ii) to improve the convenience and efficiency for the airport users. In addition, FIRR and EIRR has been recalculated and identified as much higher than expected.

3.3.1.1 Results from Operation and Effect Indicators

All important quantitative indicators that measure the effective operation of TSN airport in general and the international terminal in particular reflect remarkable increasing tendency, especially in the years after project completion. It is also noticed that actual measurements of these indicators are always higher than what was expected at the time of conducting project feasibility study and signing loan agreement.

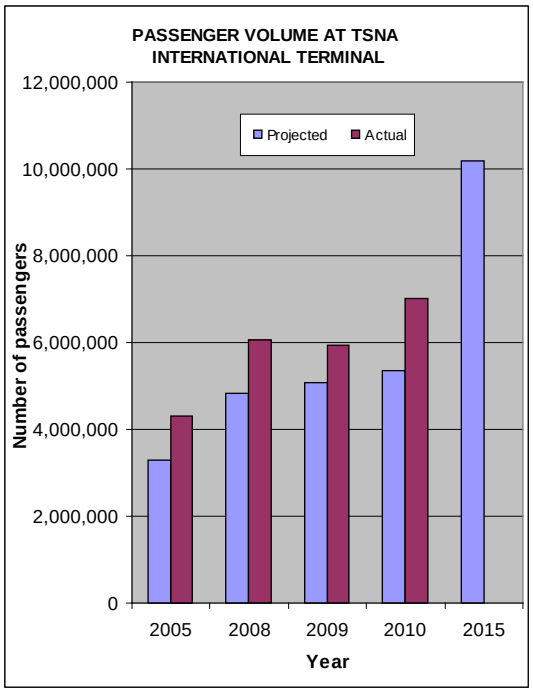
(1) Increased Number of Passengers at TSN Airport International Terminal

The construction of TSN Airport International Terminal has responded positively to the increasing demand of international travel of Vietnamese and foreign passengers. In 2010 alone, the volume of passengers traveling in and out Vietnam through TSN International Airport was recorded at 7,025,398, 31% higher than the projected volume of 5,362,000. For comparison, the figure is twice higher than that at Noi Bai International Airport, which is the second largest international airport in Vietnam[2].

The number of passengers traveling through TSN AIRPORT International Terminal increases year by year, especially in 2007, 2008 and 2010 at the average rate of 15% per year, higher than the average development rate of 14,2% per year before the project. This number is also higher than the forecast at the time of FS from 17% to 32% per year (**Figure 1**).

In 2005, FS projected figure was 3.284 million. Actual number of international passenger in that year was recorded at 4.311 million. Corresponding figures in 2008 were 4.828 million and 6.068 million; in

2010 were 6.806 million and 7.025 million respectively. The actual volume of luggage increases accordingly: 79,281 tons in 2001, 119,399 tons in 2005, 159,678 in 2008 and 183,421 in 2010.



Source: SAC; Projection of F/S

Figure 1: Annual Passenger volume at TSN Airport International Terminal before and after the project

(2) Increased Handling Capacity of TSN Airport International Terminal:

As the results of space expansion and installation of advanced equipments as well as strengthened management capacity of SAC's sub-companies and staff, the handling capacity of TSN Airport in general and TSN AIRPORT International Terminal in particular has been improved accordingly.

Before the project, in 2005, the average number of international passengers departing from and arriving at TSN International Airport was 838 passengers per hour and 1,911 passengers per peak hour. The corresponding figures recorded in 2009 were 1,339 and 2,492; and in 2010 were 1,719 and 2,683.

Similarly, indicators of passenger volume in peak day, peak month increases continuously one year after another and has always been higher than projected levels. For example, the number of peak-day-out passengers in 2010 was recorded at 12,085 passengers/day, almost twice larger than that in 2005 (5,938 passengers/peak day). The number of peak-day-in passengers in 2010 was also 2.3 time higher than 2005 (see **Table 7**).

[2] Data provided by the Department of Culture, Sport and Tourism of Ho Chi Minh city.

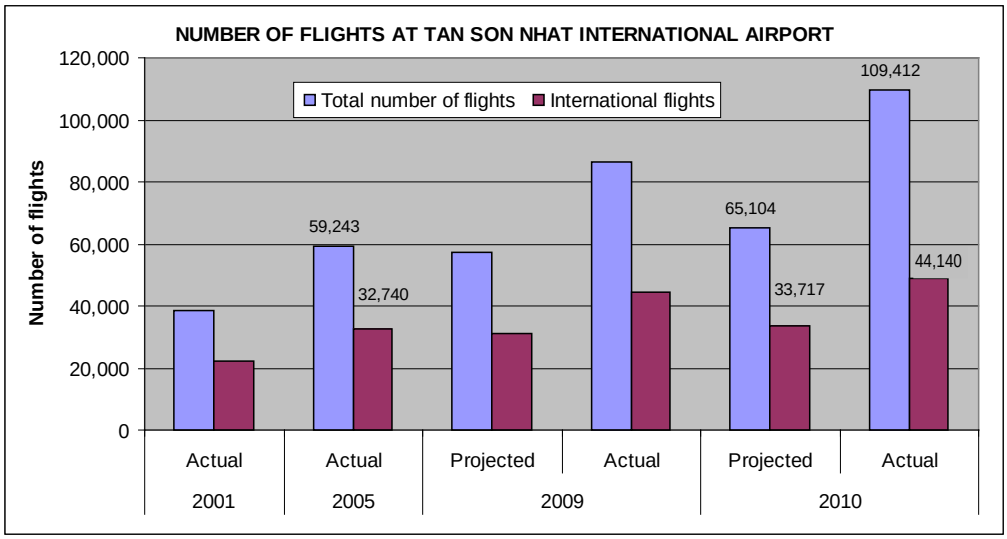
Table 7: Passenger Volume at Peak Times before and after the Project

Unit: Number of passenger

Average passenger volume	2001	2005		2009		2010	
	Actual	Predicted	Actual	Predicted	Actual	Predicted	Actual
Per hour (average)	493	674	838	927	1,339	1,204	1,719
Per peak hour		1,297	1,911	1,882	2,492	1,950	2,683
Peak day (out)	5,638	5,938	9,019	9,180	11,195	9,631	12,085
Peak day (in)	5,217	5,938	7,620	9,180	12,161	9,631	13,688
Peak month (out)	138,518	180,620	215,615	279,235	282,858	292,930	345,842
Peak month (in)	121,531	180,620	195,935	279,235	300,072	292,930	326,630

Source: SAC

Another aspect of improvement in the receiving capacity of TSN international airport is reflected by the total number of international flights annually and the number of take-off and landings at peak times. The number of international flights at TSN airport in 2001 and 2005 were 22,262 and 32,740, respectively. In 2010, the figure was recorded at 44,140, increased by 11,400 flights/year in comparison to 2005. When it comes to the combined numbers of international and domestic flights, the rate of development is even more remarkable: 59,243 flights in 2005 and 109,412 in 2010, almost double after 5 years (**Figure 2**).



Source: SAC

Figure 2: Number of Flights to and from Tan Son Nhat Airport

Peak time take-off increased from 56 flights/day in 2005 to 76 flight/day in 2010. Peak-day landing also pushed up from 53 times in 2005 to 77 times in 2010. Corresponding numbers for peak months was 1,449 in 2005 and 1,985 in 2010 (**Table 8**).

Table 8: Numbers of Takeoff and Landings in Peak Day and Peak Month at TSN Airport

Indicators	2005		2009		2010	
	Projected	Actual	Projected	Actual	Projected	Actual
Peak day take off	44	56	61	75	65	76
Peak day landing	44	53	61	73	65	77
Peak month take off	1,333	1,449	N/A	1,854	1,997[3]	1,985
Peak month landing	1,333	1,449	N/A	1,854	1,969	1,985

Source: SAC

3.3.1.2 Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR)

(1) Financial Internal Rate of Return (FIRR)

At the time when F/S and SAPROF were conducted[4], FIRR was estimated at 7.3% on the bases of expected incomes and expenses, including: (i) project implementation/construction costs, (ii) O&M costs, and (iii) large-scaled repairs and replacement of equipments.

At the time of ex-post evaluation, the evaluation team recalculated FIRR on the bases of actual incomes of the international passenger terminal after more than 3 years of operation. With regards to the costs and expenses, the proportion of O&M costs to income was applied at the same level used in F/S. However, other kinds of expenses were adjusted according to the financial condition of SAC in 2010. In addition, due to the fluctuation of exchange rate, an amount of budget is added annually to the total costs. This amount is comparatively big and accounted for approximately 25% of the total expenses of the international terminal.

The value of FIRR was recalculated at 24.1%, higher than the projected level by 3.3 times and convincingly reflects the financial effectiveness of the international terminal, which is far better than expected at the time of project approval.

The reasons for achieving such a high value of FIRR include: (i) the actual passenger throughput is far higher than the predicted level in F/S; (ii) More types and higher size of incomes than what listed in F/S; and (iii) A number of unit price is higher than those specified in F/S.

(2) Economic Internal Rate of Return (EIRR)

Using the same formula and variables of F/S, the value of EIRR at the time of ex-post evaluation was recalculated at 35.9%, which is 1.9 times higher than predicted (19.1%). It shows clearly the economic effectiveness of the project.

The reasons for achieving higher value of EIRR include: (i) the average spending per international tourist has been double after 10 years (USD 500/tourist in 2010 in comparison to USD 250/tourist in 2001), (ii) the actual passenger volume is far higher than the forecast level in F/S; and (iii) the proportion of incoming international tourist is higher than in F/S.

3.3.2 Qualitative Effects

(1) Ensured Maximum Aviation Security:

The newly constructed international terminal is equipped with security devices such as scanning machines, magnetic gates that allow detection of explosive and flammable substances and weapons. Access control system is also installed and operates 24/7 and detects any unauthorised entries to functional areas. These equipments, which are operated by well-trained staff, ensure the prevention of terrorist threats and maximum security for passengers and staff working at the terminal.

[3] New projection by SAC made in 2009 on the basis of actual development rate of passengers at TSN Airport Int'l Passenger Terminal: the projected volume of passengers is higher that that in the F/S.

[4] March 2001.

(2) Improved Quantity and Quality of Non-Aviation Services

Together with SAC's policy of encouraging fair competition, the expansion of the international passenger terminal provides efficient space and favourable conditions for accommodating more non-aviation services. As the results, types of non-aviation services provided and number of service providers at TSN International Airport increased remarkably.

Types of services are much more diversified. Before the project, only a basic services were provided at the international passenger terminal of TSN Airport. These include duty free, gift shops, restaurants, in- and outside the terminal, taxi, post office, VIP/CIP lounge and airport hotel. From 2007, many new services have been provided for the first time at the newly constructed terminal. Examples include luggage lockers, first aid, free drinking water, information counter, telephone booths, ATM machines, money exchange counters, internet connection in some designated areas, city tours for transit passengers, children's play ground, mini supermarket, spa/massage services, etc…

In term of quantity, number of gift shops increased from 3 to 27; information counters from 0 to 3; restaurants from 1 to 14 within the period from 2001-2010. Number of these providers at Tan Son Nhat airport (domestic and international terminals combined) rocketed also from 6 in 2001 with only state companies to 66 in 2005 and 95 in 2009. Corresponding figures for international terminal alone are 4, 26, and 57 in 2001, 2005 and 2009 respectively (**Table 9**).

Table 9: Number of Non-Aviation Service Providers at TSN Airport

Indicators	2001	2005	2007	2008	2009	1010
Total number of non-aviation service providers at TSN Airport (international and domestic terminals combined)	6	66	88	88	95	95
Number of non-aviation service providers at TSN Airport International Terminal	4	26	50	50	57	57

Source: SAC

It is acknowledged by many airport users that such changes in number of services and number of service providers in a fair competition environment have improved remarkably the quality of non-aviation services provided at the new international passenger terminal in comparison to the old one. (see more in **(3)** bellow).

(3) Improve the Convenience for the Airport Users:

The evaluation team collected opinions of different groups of airport users by a number of data collection tools such as semi-structured questionnaires, data sheets, in-depth interviews and group discussions. Almost all groups of respondents have experienced both old and new international terminals. With regard to passengers, a considerable proportion (41%) of the total 123 respondents, including Vietnamese and foreign passengers, have used the old international terminal.

Interview results show that most of the passengers are *satisfied* (48%) and *highly satisfied* (39%) with the facilities at TSN Airport International Terminal, especially the instruction system with sign boards and screens; the convenience of facilities at the departure lounge; and other equipments such as the moving-sidewalk and elevators. Few passengers have used other special facilities such as toilets with special equipments for infants and people with physical difficulties. However, they were all glad that the terminal is giving well care to its customers.

The proportion of passengers *highly satisfied* and *satisfied* with the facilities at the new terminal is remarkably high among those who have experienced both old and new TSN Airport International Terminal: 37% and 46%, respectively. For these passengers, the installation of more scanning, luggage security check equipments and more check-in, custom and passport

control counters makes good impression since their waiting time has remarkably been reduced. Although specific data on the time required going through all airport procedures before July 2007 are not available, the passengers stated that the current time amount spent on immigration procedure of 3 minutes is over their expectation.

In addition, the introduction of a number of free services that have never been provided in any other Vietnamese airports (such as free luggage lockers, free drinking water fountains…) is also highly appreciated by the passengers.

Nevertheless, although provide positive overall evaluation to the services of the airports, a number of passengers recommend that the price of goods and services at the international terminal is too high in comparison to what they can get from outside or from other international airport. The coverage of wifi is another point of disappointment. Passengers expect that they can have access to internet anywhere in the terminal.

Table 10: Groups of Respondents

#	Groups of airport users	Data collection tools	Sample size
1	Passengers	Semi-structured questionnaires & in-depth interviews	123 passengers
2	Representatives of State management agencies (Custom, Immigration Police, Department of Transportation, Department of Culture, Sport and Tourism)	Document review, Data sheet, in-depth interview	4 organisations
3	Representatives of domestic and international airlines	Data sheet, in-depth interview	1 domestic and 1 international airlines
4	Staff of non-aviation service providers at TSN Airport International Terminal	Semi-structured questionnaires	53 staff
5	Managers and staff working at TSN Airport International Terminal	Semi-structured questionnaires	
6	Leaders of members companies under SAC	In-depth interview	2 compamies
7	Leader of SAC	In-depth interview	1 (Deputy director genderal)
8	Local Government: Leaders of People's Committees at ward level	In-depth interview	2 (Ward 2 of Tan Binh District and Ward 10 of Go Vap District)
9	Local people	Group discussion	26 local people in Ward 10 of Go Vap District
		Semi-structured questionnaires	18 local people in Ward 2 of Tan Binh District

In summary, after the project the numbers of passenger and cargo volume as well as handling capacity of TSN airpot international terminal have been remarkablly expanded. At the same time, quality and quantity of non-aviation services have been improved and the high satisfaction of the airport passengers is shown on the convenience of its facilities and services, which includes the satisfaction on the smooth flow of passengers both in departure and arraival. Therefore, it can be concluded that this project has largely achieved its objectives of (i) meeting the increasing transport demand through TSN international airport and (ii) to improving the convenience and efficiency of the airport users.

Discussions with SAC and other concerned agencies in HCM city show that the contributing factors for achieving such good performance of effectiveness indicators include:

- The construction of the TSN airport international terminal met the urgent and remarkably increasing demands for international transportation and requirement of better connectivity for economic development at the time of appraisal, and still valid at the time of evaluation.

- As analyzed, SAC has created a good environment for fair competitiveness amongst airport service providers thus creating satisfaction of passengers as well as other airport users.
- The design of the terminal, which follows international standards and the installation of modern equipments have well ensured the passenger flow, luggage flow and passengers' convenience. In addition, the O&M staff of the airport and service providers in- and outside the airport have been well trained, supervised, and re-trained to meet the high professional standards. It is noticed that the arrangement where SAC is the project owner and at the same time the user/manager of the project result (the new international passenger terminal) has made the leaders and staff of SAC are more responsible and accountable in the construction stage as well as better prepared in the operational stage.

Therefore the project's effectiveness is high.

Box 1. Summary of Beneficiary Surveys

1. Date and place of survey: 09-17 March 2011, TSN Airport International Terminal
2. Objective of the survey: to collect passengers' satisfaction on the conditions of the terminal.
3. Survey method:
   a) A set of draft questionnaires was designed, then tested with some TSN Airport staff and passengers. Then the questionnaires were revised throughly before conducting a large survey by the team.
   b) Conducting two surveys to two major airport users, one was with passengers and the other was with staff working at the terminal.

1. Result of the survey to passengers:

	Very satisfied / Very good	Satisfied / Good	Neutral / Fair	Unsatisfied / Not good	Very unsatisfied /Very bad	Do not know / No comment
Ranks	1	2	3	4	5	
General impression of the termnal	38.6%	48.0%	9.4%	0.0%	0.0%	3.9%
Terminal's cleanliness	52.8%	40.9%	4.7%	0.8%	0.0%	0.8%
Reasonability of departure passenger flows	31.5%	45.7%	18.1%	2.4%	0.0%	2.4%
Access to information (Flight information screens, signages, information counter, Public Announcement System)	42.5%	37.8%	14.2%	3.1%	0.0%	2.4%
Availability of shops and services (e.g. clinic, spa, duty free, restaurants inside and outside, bookstores, cafe, ATM, money exchange, locker room, etc)	18.9%	39.4%	26.0%	7.9%	0.8%	7.1%
Quality of shops and services	19.7%	37.0%	25.2%	3.1%	0.8%	13.4%
Availability of toilets	39.4%	36.2%	15.0%	1.6%	0.8%	7.1%
Elevators, escalators, moving sidewalk	34.6%	41.7%	13.4%	3.1%	0.0%	7.1%
Comfortability of the boarding lounges (e.g. charis, TV, space)	42.5%	37.8%	13.4%	2.4%	0.0%	3.9%
Facilities for disabilities and passengers who need special care (old people, women with baby, wheelchairs)	12.6%	24.4%	20.5%	0.8%	0.8%	40.9%
Availability of telephones, wifi internet	6.3%	18.1%	29.1%	11.0%	4.7%	30.7%
Reasonability of arival passenger flows	22.8%	37.0%	13.4%	2.4%	1.6%	22.8%
Convenience of the baggage claim (e.g. display monitor, signages, trolleys, space)	23.6%	40.2%	11.8%	3.9%	1.6%	18.9%
Convenicence of transport services (bus, taxi, shuttles, tours)	17.3%	29.9%	19.7%	9.4%	4.7%	18.9%

2. Result of the survey to staff working in the terminal:

	Very satisfied / Very good	Satisfied / Good	Neutral / Fair	Unsatisfied /Not good	Very unsatisfied /Very bad	Do not know / No comment
Ranks	1	2	3	4	5	
Your general impression of the terminal	30.2%	52.8%	17.0%	0.0%	0.0%	0.0%
Currrent working conditions - space	20.8%	67.9%	9.4%	1.9%	0.0%	0.0%
Currrent working conditions - equipments	24.5%	49.1%	20.8%	5.7%	0.0%	0.0%
Currrent working conditions - protection	15.1%	58.5%	26.4%	0.0%	0.0%	0.0%
Currrent working conditions - trainings	15.1%	52.8%	30.2%	0.0%	0.0%	1.9%
Currrent working conditions - procedures	15.1%	60.4%	20.8%	1.9%	0.0%	1.9%
Compare between the new and the old terminal	56.6%	34.0%	0.0%	0.0%	0.0%	9.4%

3.4 Impacts

Various researches and studies have shown that air transport can play a key role in economic development and in supporting long-term economic growth. It facilitates a country's integration into the global economy, providing direct benefits for users and wider economic benefits through its positive impact on productivity and economic performance[5].

Although the contribution of TSN Airport International Terminal to the socio-economic development is yet quantified, it is reasonable to state that the construction and then operation of the new TSN Airport International Terminal generate a number of striking impacts on (i) promoting socio-economic development in HCMC and the Special Southern Economic Zone; ii) the development of aviation sector in Vietnam; iii) the environment in- and outside the airport areas; and (iv) other impacts including impact on land transport system in Ho Chi Minh city.

3.4.1 Intended Impacts

(1) Contribution to the Socio-Economic Development of HCMC and Special Southern Economic Zone

Tax contribition

Being an enterprise located in HCM city, parts of the incomes from business activities of TSN Airport International Terminal and TSN Airport as the whole contribute directly to the state budget and revenue of Ho Chi Minh City through taxation (**Table 11**) and other kind of contribution in monetary term, being part of the solutions that reduce the 2007-2009 economic crisis[6]. It is noticed that in 2007, beside a series of awards given by the Government of Vietnam and Ministry of Transportation, SAC was given the Certificate of Merit from the Ho Chi Minh People's Committee for tax obligations.

[5] For example, an IATA analysis across a wide range of 48 countries – including both developed and developing economies – and across a ten-year period, 1996 to 2005 points out that there is a positive link between a country's level of connectivity to the global air transport network and its level of productivity and economic growth. The similar link is also presented in another study titled "The Impacts of International Air Service Liberalisation on Vietnam".

- *IATA is an international trade body, created over 60 years ago by a group of airlines. Today, IATA represents some 230 airlines comprising 93% of scheduled international air traffic*
- *IATA. 2005. Aviation Economic Benefits. IATA Economic Briefing No 8*
- *InterVISTAS. 2009. The Impacts of International Air ServiceLiberalisation on Vietnam. London*

[6] Being an economic institution with access to foreign currencies, in 2009, SAC "sold" up to USD 100 million to the State Bank of Vietnam, solving part of the thirst for strong foreign exchange of national enterprises and making good contribution to the stabilisation of Vietnam economy in the context of global financial crisis.

Table 11: Tax Contribution of TSN International Airport to HCMC

Unit: Million VND

	2001	2005	2007	2010
Revenue of TSN Airport International Terminal	470,889	810,036	1,111,158	1,747,208
Revenue of TSN Airport as the whole	563,159	996,062	1,458,144	2,432,717
Tax contribution to HCMC	131,743	212,969	203,823	174,372

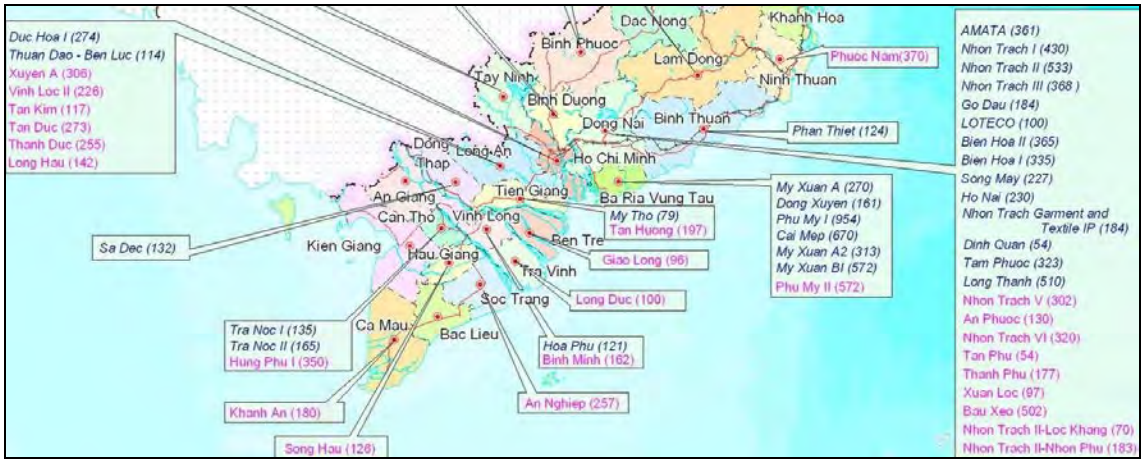
Source: SAC

Note: the differences in tax contribution due to changes in tax policies

Improved connectivity

The number of industrial parks and enterprises increased sharply in many provinces of Vietnam. In the neighbouring areas of HCMC, the number of industrial enterprises goes up to several thousands (**Map 1**).

Noticing the importance of TSN airport as the gateway to Vietnam and to the Southern Special Economic Zone where HCMC is the key member, the HCMC's People's Committee and Department of Transportation has identified the improvement of accessibility to TSN airport as one of the highest priority in the city's urban traffic network and inter-provincial transportation master plan (**Map 2**).



Source: Ministry of Natural Resources and Emvironment (DONRE), 2009

Map 1: Industrial Parks in the Southern Part of Vietnam

Source: Transportation Department of Ho Chi Minh city (2008)

Map 2: Airports in the Master Plan for Traffic and Transportation Network of HCMC

It can be said that the construction of TSN Airport International Passenger Terminal is the starting points of many other transportation projects, which aim at improving the city's traffic network on the one hand and connecting the city with other neighboring industrial zones in Binh Duong, Tay Ninh, Ba Ria-Vung Tau, Da Lat… on the other hand. Important transportation projects, which were planned during the construction and after the completion of the new terminal, are all taking into consideration the connectivity with and accessibility to TSN airport. Examples include: Highway HCMC – Trung Luong – Can Tho; the urban transportation belts No 1, 2; the improvement of the city's key traffic axes such as East-West Corridor, Truong Chinh street, Thu Thiem tunnel, Nguyen Van Troi street – Nam Ky Khoi Nghia street… Tan Son Nhat airport is also an important stop in any plan of developing HCMC public transportation system: bus routes, subway and monorail train.

Promoting economic development

The improvement of connectivity and mobility provided by the new international terminal – the gateway to Vietnam and HCM city - generate favourable environment for businesses. Many government agencies and local governments in HCM city (such as the Department of Planning and Investment, Department of Culture, Sport and Tourism, People's Committee of Ward 2 Tan Binh District and People's Committee of Ward 10 Go Vap District) acknowledge the positive impacts of the new terminal on the development of FDI enterprises and of the city's tourism sector.

Table 12: Economic Development in Ho Chi Minh City 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of FDI enterprises	664	824	843	970	1,222	1,324	1,508	1,590	2,026	
GDP of HCMC (VND thousand billion)	84	96.4	113.3	137	165.3	190.5	229.2	287.5	337	414

Source: Statistic Office of Ho Chi Minh City

Table 13: Economic Growth Rate of HCM City and Special Southern Economic Zone

	National	HCM City	Special Southern Economic Zone
GDP growth rate 2001-2005	>7%	>11%	12%
Growth of industrial sector 2001-2005	10%	13%	15%
GDP growth rate 2006-2010	8%	13%	N/A
Growth of industrial sector 2006-2010	11%	12.7%	14%

Source: Department of Planning and Investment of HCMC

According to the data provided by the Statistics Office and the Report on Implementing 5-year Socio-Economic Development Plan 2006-2010 of the People's Committee of HCMC, the number of FDI enterprises and total FDI investment to HCMC keep increasing across 2001 to 2010, despite negative impacts of 2007-2008 crisis. Average economic growth rate of HCM city from 2006-2010 remained high and was always higher than the national average level. The "size" of HCMC's economy in 2010 is 1.7 times larger than in 2005; GDP per capita in 2010 was estimated at USD 2,800 USD or 1.68 times higher than in 2005 (see more details in **Table 12** and **Table 13**).

Table 14: Development Indicators of Tourism Sector of HCMC

	2006	**2007**	**2008**	**2009**	**2010**
Total number of tourists to HCMC	2,350,000	2,700,000	2,800,000	2,600,000	3,100,000
Total number traveling by air	1,858,000	2,100,000	2,130,000	1,800,000	2,500,000
Vietnamese traveling abroad through HCMC	600,000	600,000	650,000	780,000	800,000
Total revenue from tourism (VND billion)	16,200	24,000	31,000	35,000	41,000
Travel agents	452	541	570	634	666
Companies that provide overnight stays	772	965	N/A	N/A	N/A
Hotels	872	1,054	1,165	1,350	1,461
Certified rooms	22,000	25,769	27,665	31,591	34,091

Source: Department of Culture, Sport and Tourism of HCMC (Annual Reports from 2006-2010)

According to the evaluation of the Department of Culture, Sport and Tourism, up to 69.2% international tourists going to and 80.6% leaving HCMC at TSN Airport International Passenger Terminal. The rest travel through sea ports and on-land ports. Such figures show clearly the importance of the new terminal to the development of the city's tourism sector.

Data provided by the Department of Culture, Sport and Tourism indicate that total revenue from the tourism sector of HCMC increased from VND 16,200 billion in 2006 (the year before project completion) to VND 24,000 billion in 2007 (the year when the project was completed) and VND 31,000 billion in 2008 (just 1 year after the project completion). Tourism infrastructure has also been developed remarkably with 22,000 certified rooms in 2006 to 34,091 in 2010 **(Table 14)**.

(2) Contribution to the Development of Aviation Sector in Vietnam

The increased receiving capacity of TSN Airport International Passenger Terminal and the policy of fair competition, which resulted in reasonable price and improved quality of services, have become key factors that attract more airlines to Tan Son Nhat airport. According to SAC's monitoring data, the number of airlines that have flights to and from Tan Son Nhat airport as well as use technical service here has increased from 40 in 2007 to 46 in 2010, of which international airlines from 37 to 42 respectively. Today, many world-wide famous airlines (such as: Air France-KLM; Lufthansa; United Airlines, Qatar Airways, Cathay Pacific; ANA, Air

China, JAL, Korean Air, Asiana, Air China, China Airlines…) are in the list of SAC's customers.

The Southern Airports Corporation (SAC) is currently managing 8 Airports of Southern Vietnam, including Tan Son Nhat International Airport and 7 local airports in Buon Ma Thuot, Lien Khuong, Phu Quoc, Rach Gia, Ca Mau, Con Dao and Can Tho. Experience of SAC in managing the construction and operating the new TSN Airport International Passenger Terminal is well applied in other airports, especially the international gateways of Can Tho International Airport, and Phu Quoc International Airport. Recently, SAC was assigned by the GoV to make assessement and preparation for the construction Long Thanh International Airport, which will be the largets and most modern international airport in Vietnam.

This new and modern international airport terminal with its systematically installed equipments has been the base for Vietnamese airlines such as Vietnam Airlines, Pacific Airlines, and other aviations to compete with international airlines. The effective construction and operation of the terminal have created a cornerstone for the preparation of the Long Thanh international airport that is expected to accommodate 80-100 million passengers per year.

3.4.2 Other Impacts

(1) Impacts on Environment

SAC - the corporation in charge of project management and then responsible for management, O&M, providing services and running businesses at the international passenger terminal after the project completion – conducts environmental surveillance are submits regular periodic environmental quality control reports to the Department of Natural Resources and Environment (DoNRE) of HCMC. Complying with SAC's environment protection plan and regulations of DoNRE, **quarterly reports** has been made during the construction and after the project completion, when the terminal is put in operation and cover not only the areas inside the airport but also those around it. Key monitored environment indicators are presented in **Table 15**.

The results of environment monitoring on the air quality inside and around the airport, noise level, water quality in and around the airport's waste water treatment facility in December 2010 show that:

- Most of the indicators of air quality in and around the airport are within the permitted levels regulated by the Ministry of Natural Resources and Environment (MONRE) and listed in the set of Vietnam National Standards (QCVN 05:2009/BTNMT and QCVN 06:2009/BTNMT). Exceptions are found at a number of locations including KK1 (position near the control tower), KK9 (Truong Son street), KK10 (airport entrance – No 2, Song Day street) where the concentration of dust is higher than permitted level. The concentration of VOC (Volatile Organic Compound) is also higher than the national standards at positions KK1, KK2 (air craft parking area), KK5 (bordering area between the old and new terminal), KK9 and KK10.
- Noise and vibration generated by the waste water treatment facility and other activities at TSN Airport International Passenger Terminal are kept within the permitted level (Vietnam standards for noise TCVN 5949- 1998 and for vibration TCVN 6962 – 2001) and do not noticeably affect the surrounding areas.
- Quality of water used in the airport area meets the requirements of national standards (QCVN 02:2009/BYT) regulated by the Ministry of Health.
- Almost all indicators for quality of water discharged from the waste water treatment facility meet the requirements of national standards QCVN 14:2008/BTNMT regulated by MONRE.

Table 15: Environmental Indicators Monitored

Stages		Vietnam standards	Monitored parameters	Permitted level	Monitored			
						2004	2005	2006
Construction stage	Air quality	QCVN 05:2009/BTNMT and QCVN 06:2009/BTNMT	SO2 (µg/m^3)	50				
			NO2 (µg/m^3)	40				
			TSP (µg/m^3)	140		0.40	0.37	0.40
			Particles < 10µm (µg/m^3)	50		0.25	0.24	0.26
			CO (mg/m^3)	N/A				
	Noise and vibration	TCVN 5949 - 1998 và TCVN 6962 -2001	Location 1 (dB)	75		74.6	61.4	63.1
			Location 2 (dB)	75		77.9	77.0	75.5
			Location 3 (dB)	75		75.2	61.0	61.5
	Quality of underground water	QCVN 02:2009/BYT	pH	5 - 9				
			DO (mg/l)	2				
			COD (mg/l)	50				
			Oil (mg/l)	20		0.39	0.21	0.36
			SS	100		16.3	29.8	47.1
Stages	**Monitored indicators**	**Vietnam standards**	**Monitored parameters**	**Permitted level**	**Monitored**			
					2007	**2008**	**2009**	**2010**
Operation stage	Air quality and air-born pollution	QCVN 05:2009/BTNMT and QCVN 06:2009/BTNMT	SO2 (µg/m^3)	50				
			NO2 (µg/m^3)	40				
			TSP (µg/m^3)	140		0.40	0.37	0.40
			Particles < 10µm (µg/m^3)	50		0.25	0.24	0.26
	Noise pollution as results of vehicles operation and aircrafts taking off and landing	TCVN 5949 - 1998 và TCVN 6962 -2001	Location 1 (dB)	75	74.8	69.9	68.6	74.6
			Location 2 (dB)	75	70.2	62.6	62.7	61.8
			Location 3 (dB)	75	78.3	78.8	70.3	78.3
	Quality of underground water	QCVN 02:2009/BYT	pH	5 - 9	7.4	6.7	8.13	7.17
			DO (mg/l)	2	0.9	1.0	1.2	0.9
			COD (mg/l)	50			20	31
			Oil (mg/l)	20	3.07	1.38	1.3	3.30
			SS	100	25.6	21.2	17	18

Source: Environment monitoring reports of SAC

Regarding the quality of air, water and noise level outside the airport areas, results of interviews and group discussions with leaders of local governments, local people in Ward 2 of Tan Binh district (the place where TSN airport is located) and Ward 10 of Go Vap district (the area directly under the airport approach path) (see **Table 10** for sample size) show that high concentration of dust *due to high level of traffic* around the airport is one of very few concerns of the local governments and local people about environment quality. According to the perception of local people, the level of water and noise pollution (in both during the construction and after the project completion) are acceptable.

Noticeably, all respondents of the interviews conducted in Ward 2 of Tan Binh district and Ward 10 of Go Vap district expressed their appreciation to the way of construction management, where pollution level was minimised, saying that they wish all other constructions in HCMC were managed in similar way.

Naturally, people living under the airport approaching path are the most affected by noise

and vibration caused by aircraft taking off and landing. However, discussion with a group of more than 25 people in Ward 10 of Go Vap district show that such noise and vibration only affect the elderly and children late in the evening when they are in bed. During the day time, noise caused by the aircrafts does not draw people's attention more than the noise from other sources such as cars, motorbikes and loud speakers.

Box 2. Summary of Focus Group Discussion

1. Time and Place: 14 March, 2011 at Ward 10, Go Vap District, HCMC
2. Participants: Total 25 local people
3. Discussion question: "How did the project change your life?"

Top major issues of the project to local people's daily life include:

- Noise from landing/taking off airplanes, especially during night time
- Vibration affecting houses and buildings
- Cannot build high house (and do not know how high is limited)
- Feeling of uncertain safety
- Convinicence in accessing to the airport

(2) Unexpected impact: taxi parking in not-permitted areas

The fact that a large number of international visitors travel to and from TSN international airport every day has attracted a large number of taxis in the areas around the airport. Despite regulations on picking up passengers and specified parking stations for taxis both in- and outside the airport area, many taxi drivers, for their own convenience, intentionally park their vehicles in not-permitted areas outside the airport. This is one of the factors contributing to higher traffic pressure and high concentration of dust around TSN airport. It was pointed out in the in-depth interview with the leader of Ward 2 of Tan Binh district that the situation has somehow reduced the level of satisfaction of local people to the airport.

3.5 Sustainability (Rating: 3)

3.5.1 Structure of the O&M System

Southern Airports Corporation (SAC) is a state owned Corporation under the Ministry of Transport, is currently managing 8 airports of Southern Vietnam, including Tan Son Nhat International Airport and 7 local ones including Buon Ma Thuot, Lien Khuong, Phu Quoc, Rach Gia, Ca Mau, Con Dao and Can Tho Airports. In 2008, SAC was established based on reorganization of the Southern Airports Authority (SAA). At present, SAC employs approximately 4,000 people and consists of 07 subsidiary companies operating in wide range of fields.

After project completion, SAC has been responsible for the operation and maintenance of the project items. **Figure 3** below shows the current organization of SAC. This structure is appropriate to the functions and mandates of the Corporation and ensures smooth O&M of each of the sub-ordinate units.

In addtion to the structure of SAC, the model where the project owner later become O&M agency of the project and being direct beneficiary helps the O&M of the project smooth and effective. In this project, the project owner (SAC) is also the direct beneficiary – who later operates the international passenger terminal when the project is completed. This model of practice generates a number of advantages of those two important ones include:

- SAC staff were trained during the project implementation and are capable to take over the operation and maintenance of the terminal right after the project completion.

- SAC staff were well aware of the fact that they were constructing a facility for their own company. Therefore, the staff's responsibility and accountability were strongly strengthened. This partly explains the comparative advantage project implementation period and costs.

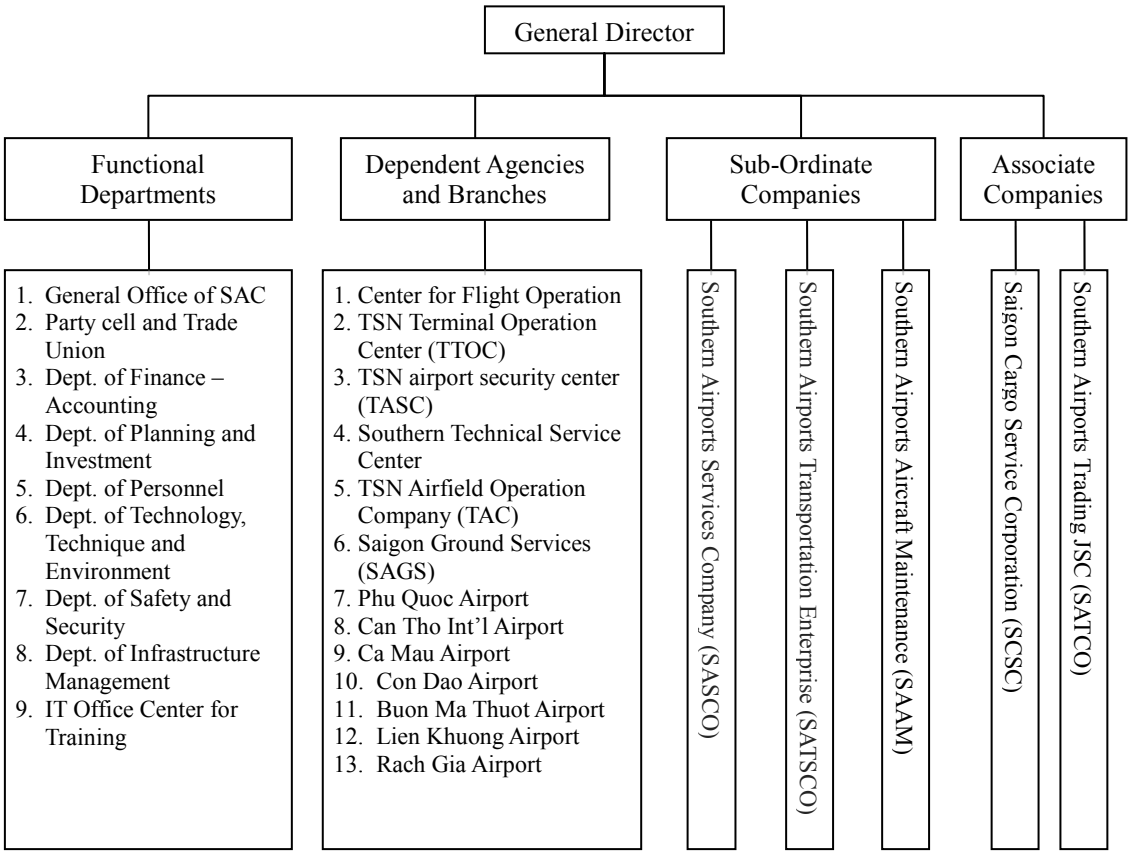


Figure 3: SAC's Organization Chart

3.5.2 Technical Aspects of O&M

(1) Technical Capacity of SAC Staff

SAC has arranged technical staff to monitor and supervise the implementation of the project. These staff, who had been trained from real work thus understanding the technical aspects of the systems, understanding the O&M precedures of the systems, have well received and managed the handed-over international terminal from the first day of operation. Moreover, those staff have been sent to specific and general trainings, organized both in-country and abroad, to obtain skills and knowledge to fulfill there duties.

Table 16: SAC's Total Staff and Number of Staff being Trained

Number of staff	2006	2007	2008	2009	2010
SAC's total staff (persons)	2,064	2,297	2,528	2,868	3,267
Number of staff being trained (persons)	1,374	5,809	6,289	501*	3,789

Source: Division of Organization and Personnels of SAC.

* Exact data of number of staff being trained internally within the organization is not available

With those regularly trained staff, SAC's units have well carried out the O&M tasks of all technical systems, together with responsibilities in O&M of the main and important systems that operate 24/7 in the terminal.

Besides domestic and international trainings, SAC staff have also been participated in a number of interal training courses organized and delivered by the Flight Control Center and Saigon Ground Services (SAGS). The contents of those trainings support the O&M of the airport and the terminal, such as: Common use terminal equipment (CUTE), automatic monitoring system for flight controlers, technology transfer and trainings for O&M and utilization of the fire distinguish system, radioactive safety for O&M staff of the scanning systems, weight balance of airplane etc.

(2) Capacity for Providing Competitive Aviation Technical Services

SAC pays great attention on creating a healthy environment for fair competition in providing both aviation and non-aviation services at Tan Son Nhat airport. The capacity of management and providing aviation services of other SAC's member companies has also been strongly improved. Sai Gon Aviation Ground Service (SAGS) is one of the typical examples. Being established by SAC in 2005, less than 2 years before the project completion, SAGS has been developing fast with its revenue increasing continuously at the average annual rate of 17% - 18%/year. At the time of evaluation, SAGS occupies up to 50% of the market share of ground services at Tan Son Nhat Airport. In June 2010, SAGS started to provide aircraft technical service, which requires highly qualified personnel, equipments and management capacity. The company is now technical service provider to 13 airlines. Engineers and technical staff of SAGS hold international professional certificates and are qualified to certify technical files for aircrafts (maximum to Boeing 777) of international airlines.

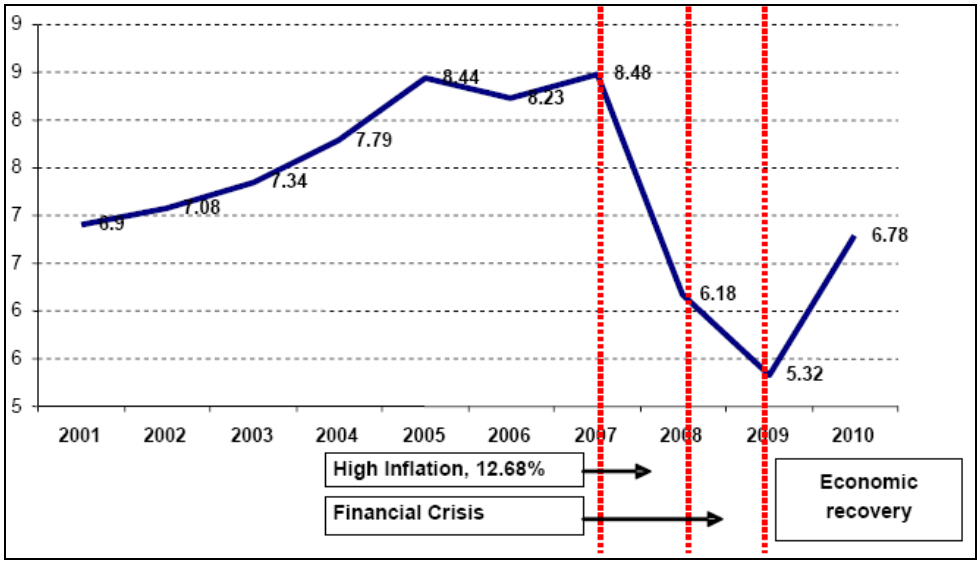
SAGS is the first typical example of SAC's effort in eliminating monopoly system in providing aviation ground services. Before 2005, the Vietnam Airlines funded TIAGS was the only aviation ground service provider at Tan Son Nhat airport and all other airlines, including domestic and international, would have to use its service. Since SAGS was established, the competition between the two service providers by setting reasonable price and improving quality of services has become one of the factors that attract more airlines to Tan Son Nhat airport. Similar situation is also observed in non-aviation services.

3.5.3 Financial Aspects of O&M

(1) Revenue of TSN Airport International Passenger Terminal

TSN Airport International Terminal started operating in a context where Vietnam economy was in its recession due to negative impacts of the global financial and economic crisis 2007-2009. The average annual growth rate of Vietnam's economy dropped from 8.48% in 2007 to 6.18% in 2008 and further to 5.32% in 2009 (**Figure 4**).

In such a context, revenue of TSN airport in general and of TSN Airport International Terminal in particular kept increasing. Total revenue of the new international terminal reached the level of over VND 1,111 billion right in the first year of operation. The revenue in 2010 was recorded at VND 2,747 billion **(Table 17**).



Source: GSO (2010)

Figure 4: Economic Development of Vietnam from 2001-2010

Table 17: Operation Revenue of TSN Airport International Terminal

Unit: Mil. VND

	2001 Actual	2005 Actual	2007 Actual	2010 Actual	2015 Predicted	2020 Predicted
Passenger service charge (PSC)	227,567	376,746	580,298	1,006,816	1,809,818	1,827,916
Revenue from Aviation Service charges	179,342	302,865	348,704	466,474	625,502	631,757
Space and office lease Revenue	34,120	70,032	100,430	177,620	192,873	194,801
Revenue from concession	10,275	20,821	25,285	26,937	30,398	30,702
Revenue from aerobridge charge	15,424	33,983	40,533	46,002	57,827	58,406
Other	4,161	5,589	15,908	23,359	24,689	24,936
Total	**470,889**	**810,036**	**1,111,158**	**1,747,208**	**2,741,107**	**2,768,518**

Source: SAC

(2) Budget allocated for O&M

According to SAC, the costs for O&M have been well ensured by the revenues from different servises of the new terminal.

Beside the operation, maintenance and training for the staff, SAC has outsourced some of the high-tech, special and important systems to experienced contractors, such as the systems of FIS, MIS, fire distinguish, gate control, waste water treatment, elevators, escalators, parking control, etc. The outsourcing on the one hand reduces significantly the maintenance costs, on the other hand ensures the quality of the operation of those systems. The O&M costs have been taken from the regular/recurrent costs of the Corporation, thus being ensured annually.

Table 18: O&M Costs of the TSN International Airport Terminal

Unit: Mil. VND

	2001 (act.)	2005 (act.)	2007 (act.)	2010 (act.)	2015 (est.)	2020 (est.)
Whole TSN airport	57,030	48,511	27,716	64,457	82,265	104,494
International terminal				20,933	26,000	30,000

Source: SAC

3.5.4 Current situations of O&M

Current situations of O&M can be divided into two parts: Operation, and Maintenance. For Operation, there are three Centers that are operation the airport:

- Southern Technical Service Center: its 41 staff are splitted into three shifts (12 persons/shift) to operate 24/7 the following systems: Baggage handling system (BHS), Building management system (BMS), air ventilation and conditioner systems, and equipments in the power generation station inlcuding the generators.
- TSN Terminal Operation Company (TTOC) operates the telephone center (7 staff), car toll system (18 staff), wastewater treatment system (4 staff), and other systems such as escalators, elevators, autodoor, sliding gate, shutter door, reservour and pumping systems.
- TSN Security Center operates 24/7 the access control system (ACS) with 4 staff on each shift.
- Besides there are other monitoring systems that are run by responsible agencies such as airport flight information system (FIDS), management information system (MIS), closed-circuit television (CCTV) etc.

For Maintenance, there are Centers under SAC and contracted companies outside the SAC that are maintaining the equipments of the terminal in particular, and of the whole airport in general:

- Southern Airport Technical Services Company (SATC) has three teams including Electro-Refrigeration team (81 staff), Electronic team (22 staff), IT team (24 staff) that are maintaining and reparing most of the technical equipments in both domestic and international terminals.
- Besides, TTOC has contracted outside companies for maintaning some of the equipments and systems of the terminal, such as Cao Thien Tao Company that is responsible for maintaining the wastewater treatment system, Melco Company takes care of the elevator and escalator systems, Schnindler maintains the moving sidewalk system (MSW)], Tien Phong Company maintains the auto door systems, etc.

All of the equipments and systems are well operated and maintained.

Besides, SAC has sufficient O&M manuals for all various operations in the airport. All of them are stored in both soft and hard copies. Each unit has sufficient technical detailed guidelines for its own area of responsibility. The manuals are well printed, easy to reach, and carefully and regularly used.

Being well aware of the importance of TSN airport as a key gateway to and from Vietnam, and as one of the symbol of the city, SAC and the local authorities have strongly enforce the policy of keeping beautiful landscape outside and along the streets leading to the airport.

As mentioned above, there is no problem with the O&M system. Therefore the sustainability of the project is high.

4. Conclusion, lessons learnt and recommendations

4.1 Conclusion

In light of such findings, this project is evaluated to be **highly satisfactory** (Overall Rating: A).

4.2 Recommendations

Recommendations to SAC:

The situation where a big number of taxis always parking in not-permitted areas outside the airport has somehow reduced the level of satisfaction of local people to the airport. This, in practice, turns out to be not a simple problem to be solved. It is recommended to SAC to effectively cooperate with the People's Committee of Ward 2 of Tan Binh district, and concerned authorities of HCMC such as Department of Transportation, Traffic Police Force and many other concerned agencies to regulate and monitor the operation of taxi companies in and outside the airport area.

4.3 Lessons Learnt

Working safety should be strictly monitored and enforced: Safety regulations were strictly monitored during the project implementation. As the results, there was no major accident during 16 million working hours of the project implementation.

Model of project owner being project O&M agency and direct beneficiary: This project should be a good example of how effective and efficient the O&M of the project have been achieved. On the one hand, capacity of SAC staff are built to take over the O&M of the terminal after the project completion.On the other hand, the staff are fully aware that the works that they contributed to will be their own properties that later generate their benefits, thus increasing accountability.

Creating fair competition environment would ensure the quality of services: By establishing SAGS, SAC has initially and succesfully attempted to eliminate monopoly in aviation service provision in the TSN international airport. The compatition between SAGS and TIAGS sets more practical costs for and better quality of the services thus attracting more customers – airlines, to the airport. Similar situation is also observed in non-aviation services.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs		
1.1. Terminal facilities		
▪ Number of floors	3 floors	3,5 floors
▪ Total floor area	~ 75,000 m^2	93.000 m^2
▪ Area of Site clearance	150,000 m^2	129,000 m^2
1.2. Special equipments		
▪ Baggage handling system	2 sets	Same as planned
▪ Passenger boarding bridge	6 sets	8 sets
▪ Flight information display system	1 system	Same as planned
▪ Escalator	9 sets	18 sets
▪ Elevator	14 sets	20 sets
▪ Security system		
▪ X-ray equipment	16 sets	Same as planned
▪ Arch-shape metal detector	10 sets	Same as planned
▪ Common use terminal equipment (CUTE)	1 system	Same as planned
1.3. Civil work		
▪ Road	~ 41,000 m^2	- Area of Road: 55.000 m^2 - Car park Area: 23.000 m^2 - Area of GSE lanes and parking: 13.000 m^2 - Viaduct: 10.540 m^2
▪ Car park	~ 34,000 m^2	
▪ Ground Service Equipments (GSE) lanes & parking	~ 32,000 m^2	
1.4. Aircraft fuel system		
▪ Pipes system	3,500m ĐK 14”	Same as planned
▪ Other system	06 tunnels with 27 valves controlled by motor	Same as planned
1.5. Airport utilities		
▪ Electricity supply	1 system	Same as planned
▪ Internal lighting	1 system	Same as planned
▪ External light	1 system	Same as planned
▪ Telephone	1 system	Same as planned
▪ Water supply o *water tanks* o *pumps* o *pressurized tank*		 - 2 sets - 4 sets - 2 tanks
▪ Clean water treatment system		1 system
▪ Waste water treatment system		1 system
▪ LPG system		1 system
▪ Solid waste treatment	N/A	N/A
▪ Other utilities (see attached file)		
1.6. Consultancy		
▪ Detailed design	Foreign: 116 MM Việt Nam (133+200)MM	Foreign: 128 MM VN: 117 MM
▪ Tendering	Foreign: 33 MM VN: (31+70) MM	Foreign: 21 MM VN: (7+32)MM
▪ Construction supervision	Foreign: 285 MM VN: (344+197) MM	Foreign: 378 MM VN: (398+437) MM
▪ Maintenance Supervision) (including environmental management and supervision during the warranty period)		Foreign: 33 MM VN: (25+49) MM

Item	Original	Actual
2.Project Period	End of 2001 – December 2006 (61 months)	March 2002 – July 2007 (64 months)
3.Project Cost Amount paid in Foreign currency	18,345 million yen	19,826 million yen
Amount paid in Local currency	8,441 million yen	8,641 million yen
Total	26,786 million yen	28,467 million yen
Japanese ODA loan portion	22,768 million yen	22,155 million yen
Exchange rate	USD 1 = VND 14,600 = JPY 122 (As of June 2001)	JPY 1 = VND 139.9 (Average between 2002 and 2008)

Secondary Evaluation Report on Dai Ninh Hydropower Project (1)(2)(3)
in the Socialist Republic of Vietnam

Takako Haraguchi, International Development Associates

Profile of the Project for the Primary Evaluation

Title	Dai Ninh Hydropower Project (1)(2)(3)
Objective	To meet the increasing power demand in the Southern region of Vietnam, to enhance irrigation agriculture in Binh Thuan Province, and to support the improvement of living standard of indigenous people in the project site, through construction of a hydropower plant and related facilities as well as the Indigenous People Development Program (IPDP).
Loan Amount Approved / Disbursed	(1) 4,030 million yen / 2,956 million yen (2) 10,000 million yen / 8,924 million yen (3) 19,142 million yen / 16,691 million yen
Loan Agreement Date	(1) March 1999, (2) March 2001 and (3) March 2004
Completion Date	April 2008
Executing Agency	Electricity of Vietnam (EVN)

Profile of the Primary Evaluation

Type of Evaluation	Ex-post evaluation
Evaluators	Vietnamese Primary Evaluation Team for Dai Ninh Hydropower Project (Ministry of Planning and Investment, Ministry of Industry and Trade, EVN, Project Management Board No.6 of EVN, Dai Ninh Hydropower Company of EVN, and evaluation consultants)
Period of Evaluation	November 2010 – July 2011 (Fieldwork: March 2011)
Evaluation Rating	Highly satisfactory (A) with sub-ratings of relevance=high (3), efficiency=fair (2), effectiveness=high (3), impact=high (3)[1], and sustainability=high (3)

1. Framework of Secondary Evaluation

1.1 Background and Purpose of the Secondary Evaluation

This secondary evaluation is part of the Vietnam-Japan Joint Ex-post Evaluation Program, collaboration between Ministry of Planning and Investment (MPI) and Japan International Cooperation Agency (JICA) for evaluation capacity development in Vietnam. Every year since the Program started in 2007, a couple of Japanese ODA loan projects have been evaluated in their ex-post stages by project-wise joint evaluation teams consisting of the Vietnamese and Japanese evaluators. Year by year, the responsibility on the Vietnamese side has become larger. In JFY2010, evaluation ownership was further transferred to the Vietnamese side, which is now expected to plan, manage, implement and use evaluations on their own, by introducing the two-step evaluation as follows:

STEP 1 - Primary evaluation conducted by the Vietnamese evaluation team consisting of project-related organizations and external evaluators (national consultants) with guidance and suggestions by the Japanese secondary evaluator; and

[1] In the JICA project evaluation system, a single rating is given to effectiveness and impact. However, the Joint Evaluation Team decided to give separate ratings to effectiveness and impact.

STEP 2 - Secondary evaluation or evaluation of the primary evaluation. Secondary evaluation is conducted by the Japanese secondary evaluator.

There are two major purposes of the secondary evaluation:

(1) Evaluation capacity development of the Vietnamese government officials and consultants through verification of their evaluation process and reports; and

(2) Ensuring JICA's accountability by validating the evaluation judgment made in the primary evaluation from the viewpoint of the JICA's evaluation criteria.

1.2 Scope of the Secondary Evaluation

The object of this secondary evaluation is the ex-post evaluation of Dai Ninh Hydropower Project (1)(2)(3), the primary evaluation.

1.3 Methodology[2]

To serve the above purposes, the secondary evaluation was designed to answer the two major evaluation questions:

(1) Is the process and results of the primary evaluation good? (quality control)

(2) Is the evaluation judgment valid considering the evidence presented? (accountability)

For the quality control, the secondary evaluator reviewed the process and report of the primary evaluation based on a pre-defined checklist. For validation of the evaluation judgment, the secondary evaluator reviewed the findings presented in the primary evaluation report in the light of the JICA's evaluation criteria and sub-criteria for Japanese ODA loan and grant projects. For these purposes, the secondary evaluator joined the primary evaluators on meetings to design and process the primary evaluations as well as the field trip.

The secondary evaluator reviewed the primary evaluation report twice -- the first draft and final draft -- and shared the review results with the primary evaluation team, which then improved the quality of the draft.

Checklist for Quality Control of Evaluation Process and Results

I Evaluation Process	**1. Schedule, Budget and TOR** (1) Appropriate scheduling, (2) Adherence to schedule, (3) Budget, (4) Adequateness of TOR, (5) Adherence to TOR
	2. Evaluation Design (1) Logic model, (2) Evaluation questions, (3) Data collection, (4) Information and data management
II. Evaluation Report	**3. Background** (1) Evaluation purpose and methods, (2) Evaluators, (3) Necessity of Project, (4) Output, outcome and impact
	4. Evaluation on Relevance Quality of the report: (1) National development strategy (2) Sector policy, (3) Comparability, (4) Development needs, (5) Japanese ODA policy Comments on Value Judgment
	5. Evaluation on Efficiency Quality of the report: (1) Details of output, project period and project cost, (2) Output, (3) Project period, (4) Project cost Comments on Value Judgment

[2] References: JICA References on Ex-post Evaluation; Western Michigan University, Evaluation Checklists (http://www.wmich.edu/evalctr/checklists/); Secondary Evaluation by the Advisory Committee on Evaluation (http://www.jica.go.jp/english/operations/evaluation/reports/2007/pdf/2007_04_01.pdf).

	6. Evaluation on Effectiveness Quality of the report: (1) Evidence, (2) Selection of evidence, (3) Reasons, (4) IRR Comments on Value Judgment
	7. Evaluation on Impact Quality of the report: (1) Evidence, (2) Beneficiary, (3) Environment, (4) Land acquisition and resettlement Comments on Value Judgment
	8. Evaluation on Sustainability Quality of the report: (1) Institutional arrangement, (2) Staffing, (3) Technological level, (4) Source of O&M budget, (5) Amount of O&M cost and O&M budget, (6) Maintenance activities Comments on Value Judgment
	9. Conclusion, Recommendations, and Lessons Learned Quality of the report: (1) Representation, (2) Feasibility of recommendations, (3) Concreteness of recommendations, (4) Relevance of recommendations, (5) Feasibility of lessons learned, (6) Relevance of lessons learned
	10. Overall Quality of the report: (1) Consistency across sections, (2) Data table, graph and photos, (3) Data source, (4) Description of social survey, (5) Limitation of the evaluation, (6) Deviation from rating criteria, (7) Protection of personal information

1.4 Constraints and Limitation of this Secondary Evaluation

None.

2. Evaluator

Takako Haraguchi, International Development Associates

3. Summary of the Primary Evaluation Results by Vietnamese Evaluation Team

(1) Relevance. 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.

(2) Efficiency. Although the project cost was within the plan, the project period exceeded, therefore efficiency of the project is fair.

(3) Effectiveness. This project has largely achieved its objectives, therefore its effectiveness is high. Since it started operation in 2008, the 300MW Dai Ninh Hydropower Plant has generated average 1,183GWh every year, which is slightly higher the target (1,178GWh). After Dai Ninh Plant, water is provided to the 30MW Bach Binh Hydropower Plant, which EVN constructed downstream Dai Ninh Plant by its own investment to generate additional 114GWh per year, and then utilized for agriculture in Bach Binh District, which added approx. 2,000 ha of irrigated land after the project. The project-affected indigenous people benefited from IPDP in terms of better infrastructure, access to public services (school, hospital and market). The financial internal rate of return was re-calculated to be 11.25%, which was almost same as the calculation in the appraisal (11.9%).

(4) Impact. A number of positive impacts were observed while there were some negative impacts. Positive impacts includes the support for rapid economic development of the country by adding power sources, increase in agricultural production in Bach Binh district (20-30% annual increase in paddy rice production after the project). Also, the road and bridges built for construction of this project became a main route to connect Lam Dong and Binh Thuan

provinces and realized better transportation of people and goods. As for negative aspects, the team observed EVN's or local governments' insufficient fulfilment of mitigation measures against environmental impacts, such as improper discharge of water downstream the dam (spillway) during the night time, delays in afforestation programs by the province, and non-regulated discharge of water downstream the hydropower plant during floods..

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

(6) Conclusion. In the light of the above, this project is evaluated to be (A) highly satisfactory.

(7) Recommendations. (i) To complete all project components, Dai Ninh Hydropower Plant should fix the problem of communication system, and local authorities of Lam Dong Province should solve the problem of non-utilization of irrigation pump systems in the rehabilitation area. (ii) To avoid negative impacts, Dai Ninh Hydrpower Plant should (a) strictly commit to discharge $0.7m^3$ or more water to downstream to ensure water in Duc Trong district during 24 hours a day, and (b) ask the National Load Dispatch Center of EVN for lower operation of the hydropower plant in case of floods in order not to aggravate damages. For the same purpose, Binh Thuan province should promote afforestation programs.

(8) Lesson learned. (i) Future project involving land acquisition and resettlement can learn from good practices of this project, including (a) good coordination among related parties and support from local authorities, and (b) support to indigenous or affected people in a sustainable way – not only compensate them by land, resettlement site and money but also support them in social development so that they can get on well with the changing life. (ii) Participation of operation agencies in the construction stage can improve sustainability. (iii) Good coordination between the project management unit, the operation agency and the contractor, at the initial stage of operation, can promote smooth operation and commissioning.

4. Summary of the Secondary Evaluation Results and Recommendations

As the primary evaluation satisfied most of the check points with some small concerns, the evaluation process and the quality of the report are evaluated as satisfactory. There are rooms for improvement in some aspects such as schedule control and reader-oriented presentation of the report, such as better editing and spelling out of technical arguments.

The value judgment made in the primary evaluation is valid considering the evidence: relevance is high (3), efficiency is fair (2), effectiveness is high (3), impact is high (3), sustainability is high (3), and thus the overall evaluation is highly satisfactory (A).

5. Analysis of Process and Report of the Primary Evaluation

Verification of the Evaluation Process

5.1 Schedule, Budget and TOR

The brief overall evaluation schedule was drafted by the Japanese secondary evaluator, and the Vietnamese primary evaluation team refined it and prepared a detailed work plan with interim deadlines in each step of evaluation. The overall period of the primary evaluation was approx. eight months from November 2010 to July 2011. Although enough time was allocated for the primary evaluation, interim deadlines were sometimes not kept due to overload of team members. In particular, finalization of the primary evaluation report took very long time as the

team (except members from the project management unit) lost concentration to finish the work after the final feedback workshop (where the team presented the primary evaluation results) in July. Insufficient management structure (mentioned below) also affected this situation.

The cost for the primary evaluation was shared by the Japanese side (remuneration for consultants, cost for trainings, meetings and workshops, vehicles during the field work) and the Vietnamese side (travel expenses for trainings, meetings, workshops and fieldwork). There was no major problem in the amount of the budget for conducting the primary evaluation.

As mentioned above, the Vietnamese evaluation team was supposed to manage, not only implement, the primary evaluation. TORs were prepared separately for the "management team" and the "implementation team", the newly-introduced sub-division of the Vietnamese evaluation team in response to the increased tasks on the Vietnamese side. The TOR for the implementation team was clear for both the government members and consultants, while the TOR for the management team was not fully understood by some members from the government (i.e. they interpreted that the only task for the management team was to attend a few workshops and acknowledge the draft evaluation report, while there were many other tasks of schedule and quality control had been assumed). This was possibly because evaluation management was still new in Vietnam, though the legal framework (such as No. 131/2006/ND-CP) provides outsourcing of project evaluation to external evaluators.

5.2 Evaluation Design

At the beginning of the evaluation design, the primary evaluation team developed the logic model of the project. Then, they identified evaluation questions and data collection strategy to answer each question in a format of evaluation planning framework.

In the first draft of their evaluation planning framework, there was confusion between outcomes and outputs. Later, the problem was solved and the logic model improved much to a sufficient level. Likewise, the evaluation questions became more to the point as they repeated discussions and with suggestions from the secondary evaluator.

Data sources were very detailed and realistic given the fact the team included the members of the project management unit and the hydropower plant who have been involved in the project or knew well about it. This is an advantage of this kind of (partial) internal evaluation.

Verification of the Evaluation Report

5.3 Background

The format of the primary evaluation report was taken from that of JICA project evaluation, which does not have distinct sections on evaluation purposes and methods in individual reports (instead, JICA includes them in its annual evaluation report as common information to all project evaluations). If the Vietnamese side is to publicize the primary evaluation reports as a stand-alone document, the evaluation purposes and methods should be added to the report.

Other essential background information such as the evaluators as well as the project outlines are all presented in the report.

5.4 Relevance

The relevance section is satisfactory.

In the policy aspect, the report shows relevant sections of the Socio-Economic Development Plans and Power Sector Master Plans at the times of both ex-ante and ex-post evaluations as the development policies that have supported the project.

In the needs aspect, the report shows the rapid GDP growth and accompanying high electricity demand with data before and after the project, which indicates the continuing needs for power source development.

5.5 Efficiency

The efficiency section is partially satisfactory, with rooms for improvement especially with regard to the project outputs.

The description of the outputs is precise as it was drafted by the project management unit of this project. It is observed that they tried hard to summarize the outputs as much as possible, and show details in the attachment. In the first draft, the contents were not very friendly for readers who are not familiar with technical details of power generation and civil works. Later, this aspect was improved with explanations of technical terms.

5.6 Effectiveness

The effectiveness section is satisfactory.

The evidence that the evaluation team selected (i.e. outcome indicators such as electricity generation output as against the target, the amount of water supply from the hydropower plant and irrigated area, and some qualitative information to show the improvement of living standard of the indigenous people using the results of the focus group discussions and surveys) is direct and valid in verifying the intermediate outcomes.

The report also clearly explains reasons for an increase/decrease in each outcome indicators (e.g. fluctuation of rainfall as an influencing factor to plan vs. actual differences in electricity generation).

The re-calculation of financial internal rate of return (FIRR) and economic internal rate of return (EIRR) and comparison of it with the planned value is at a satisfactory level for this kind of ex-post evaluation (i.e. comprehensive; not focusing only on economic and financial analyses), too. The reasons for the plan-actual gaps are analysed and explained.

From a viewpoint of Japanese ODA, a remark could be added that synergy effects are expected from this project and the two more on-going JICA-assisted projects: Phan Ri-Phan Thiet Irrigation Project (ODA Loan agreed in 2008) and the Technical Cooperation Project for Agriculture Development in Phan Ri-Phan Thiet (Technical Cooperation agreed in 2011). Both projects are to make better use of water from Dai Ninh and Bach Binh Hydropower Plants for approx. 10,000ha of additional irrigation land in Bach Binh district. The construction of the irrigation facilities are expected to complete in 2012.

5.7 Impact

The impact section has much improved compared to earlier drafts in terms presentation of both positive and negative findings with evidence, though there is still rooms for improvement by further refining the analysis and presentation of what the team observed. Overall, the impact section is evaluated as partially satisfactory.

The evidence the evaluation team selected (i.e. GDP growth, power demand-supply gap, rice production, income of the poor, and some qualitative information) is direct and valid to assess the intended impact of this project even though the report could only tell the project partially contributed to the observed positive changes (i.e., analysis of attribution is difficult within the framework of this joint evaluation).

The report does not expressly define who benefitted from this project, though beneficiaries are quite clear if reading it through: (1) the whole population benefiting from power supply, (2) farmers in Bac Binh district, Binh Thuan province benefiting from irrigation water supply, and (3) indigenous people in Duc Trong district benefiting from IPDP It would be better if the approximate size of each beneficiary group is provided, and if clarification is made on whether the whole population of Duc Trong district benefited from IPDP or only the people directly affected by the project.

Regarding environmental impact, which is one of the major concerns of many audiences, the report mentions some negative findings (i.e. those related to water discharge downstream and decrease in forest area). As those issues are relatively small compared to huge positive

impacts, the report maintains a high evaluation of impact. Also, data are lacking to determine causal relationship between this project and the problems. Being fully aware of this, the evaluation team decided to mention them after repeated discussions to draw attention of the executing agency and local governments for further improvement of the situation of the project-affected areas. The team's serious commitment in this evaluation not to score a finished project but to use this opportunity to enhance project impacts is highly appreciated.

Another biggest concern, impact of the land acquisition and resettlement, is handled as the direct outcomes of the project in the effectiveness section. The secondary evaluator agrees that the support to people affected by the land acquisition and resettlement is one of the points that are noteworthy about this project.

5.8 Sustainability

The sustainability section is partly satisfactory, with some missing information.

The report clearly states the organizational setting for operation and maintenance of the facilities built by the project. The evaluation of technical levels of operation and maintenance staff is good, too. However, weaknesses are observed in the evaluation of financial aspects for operation and maintenance and current situation of operation and maintenance.

The financial aspects could be improved if the report shows, in addition to the current indication of the summary income statements of the hydropower company, the required and actual operation and maintenance cost that it says is covered by the operation revenue.

The evaluation of operation and maintenance situation could be better supported if the report briefly describes types and frequency of maintenance activities.

5.9 Conclusion, Recommendations and Lessons Learned

The recommendations and lessons are generally agreeable, but there are some concerns.

The recommendations are mostly concrete enough to follow. It is also well supported by the evaluation findings presented in the main body. However, the recommendation to Lam Dong province to utilize irrigation pumps that have never been used is questionable: according to the ex-watchman of the pump house, measures such as organization of users groups with fee collection had been tried but not worked because the specification of the pumps had not matched their needs. Under such circumstances and after the long years of abandonment of the pumps, it would be very difficult to come up with a feasibly solution.

As for the lessons learned (significance of IPDP), it is not clear whether all projects that accompany involuntary resettlement should have this kind of development program, and how deep the project should be involved in it. Normally it is difficult to generalize the findings from only one case and determine the conditions and situations where the lesson is applicable. Nevertheless, the lessons presented in this report show a concrete good practice, which future project planners can refer as one case study.

5.10 Overall

The information in background, body sections and the comparison table (attached to the end of the report) are consistent. Data tables, graphs and photos clearly support the argument. Further editing in terms of notation, grammar and layout could have improved the quality of the report more.

6. Attachment

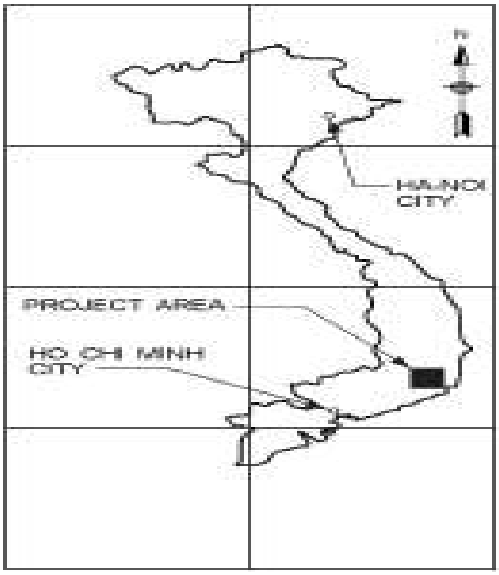
Primary Evaluation Report on Dai Ninh Hydropower Project (1)(2)(3)

Vietnam

Ex-Post Evaluation of Japanese ODA Loan Project
"Dai Ninh Hydropower Project"

Evaluator: Joint Evaluation Team for Dai Ninh Hydropower Project 2010
On-site Survey: March 2011

1. Project Profile



Project Site

Dai Ninh Power house

Dai Ninh Hydropower Project has the capacity of 300MW with the average output annually of 1.2 billion kWh, after more than two years of operation it has been made 2.9 billion kWh.

The project was constructed under fund of the ODA Loan from Japan (75%) and Vietnam Government's portion (25%).

The Employer of the Project was Electricity of Viet Nam (EVN) who representative by Hydropower Project Management No.6 (HPMB6).

1.1 Background

In Vietnam, demands for electricity have been increasing rapidly along with economic development since the instruction of the "*Doi moi" Policy in 1986*. At the time of the project appraisal power shortages had already become a serious problem in Viet Nam, especially in Southern Vietnam. It was projected that during period till 2005, the power demand would increase by 11.7-14.1% p.a. in the entire country which was a very high rate requring more installed capacity of power plants..

The installed generation capacity as of 1998 was 5,233MW (2,390MW thermal, 2,834MW hydro and 9MW other) as a whole. To meet the demand mentioned above, a minimum output of 12,357MW in Vietnam was required in 2006.

In 1994, a 500kV transmission line to connect the north and south was commissioned so that power shortage in the South could be alleviated by supply from the north. Nevertheless, it was projected that northern Vietnam would also run short of power in the near future due to rapid economic development. In sum, even with power supply from other areas, the development of large-scale power resources was necessary in the South.

In addition, about 40,000 cultivated hectares in Binh Thuan Province are in danger of becoming desert as a shortage of irrigated water. Hydropower plant located in Lam Dong and Binh Thuan on the one hand can supply additional power to ease the shortage of electricity, on the other hand, to rescue a huge land for agriculture.

1.2 Project Outline

The objective of this project is to meet the increasing power demand in the Southern region of Vietnam. Dai Ninh Hydropower Project (HPP) is power generation and provision of water for irrigation for forest, agriculture development in downstream areas, and at the same time help improvement of environment, ecology creating ideal tourist resorts. What is special here is that after commissioning, water discharged from power generation will be further utilized for Bac Binh Hydropower Plant of 33 MW in capacity, and then water being discharged to Song Luy Reservoir of Phan Ri-Phan Thiet Irrigation Project. It helps reclamation of 40,000 hectares of agricultural land that is under serious water problem and in danger of a desert in North Phan Thiet, Bac Binh District and part of Tuy Phong District, Binh Thuan Province. In addition, support the improvement of living standard of indigenous people in the project site by implementing environmental preservation; the indigenous people development plan (IPDP) and resettlement and rehabilitation action plan (RRAP).

Logical Framework

Goal	Support socio-economic development of Vietnam in general and of Southern region in particular.
Purpose	1. To meet the increasing power demand in the Southern region of Vietnam 2. To enhance irrigation agriculture in Binh Thuan Province 3. To support the improvement of living standard of indigenous people in the project site
Outcomes	1. Increase in power supply to the Southern region 2. Supply irrigation water to Binh Thuan province 3. Better living condition and livelihood of indigenous people in the project site
Outputs	1. Dai Ninh hydropower plant (300MW) 2. Transmission lines (from Dai Ninh HP to Di Linh and Phan Ri substation) 3. Substations (110kV and 550 kV) 4. Consulting services 5. Indigenous People Development Program (IPDP) 6. Development of Resettlement and Rehabilitation Action Plan (RRAP)
Inputs	1. Total cost: 49,270.989 million Yen (JICA loan: 33,171.814 million Yen; Gov't portion: 16,099.175 million Yen

Outline of Loan Agreement

	L/A 1	L/A 2	L/A 3
Approved Amount/ Disbursed Amount	4,030 million Yen / 2,956 Million Yen	10,000 million Yen / 8,924 Million Yen	19,142 million Yen / 16,691 Million Yen
Exchange of Notes Date/ Loan Agreement Signing Date	03 29, 99 / 03 30, 99	03 30, 01/ 03 30, 01	03 31, 04/ 03 31, 04
Terms and Conditions - Interest rate - Repayment period - Grace period - Procurement	 0.75% p.a. 30 years 10 years General Untied	 0.75% p.a. 30 years 10 years General Untied	 0.75% p.a. 30 years 10 years General Untied
Borrower / Executing Agency	The Government of the Socialist Republic of Vietnam (GOVN)/Electricity of Vietnam (EVN)	GOVN/ EVN	GOVN/EVN
Final Disbursement Date	MM DD, YY 07/18/2006	MM DD, YY 07/18/2006	MM DD, YY 08/11/2010
Main Contractor (Over 1 billion yen)	Kajima-Kumagai-Song Da Joint Venture (KKS), Hazama Corporation, IHI-Sakai Joint Venture, Consortium Toshiba-Sojitz, Consortium Sumitomo-Japan AE Power		
Main Consultant (Over 100 million yen)	JV of SOGREAH Ingenierie & SNC Lavalin International Inc JV of NIPPON KOEI Co, Ltd & EPDC Ltd		
Feasibility Studies, etc.	EVN, feasibility studies, 1994.		
Related Projects	Resettlement and rehabilitation action plan (RRAP) Indigenous People Development Plan (IPDP)		

2. Outline of the Evaluation Study

2.1 External Evaluator

The primary evaluation was solely done by Vietnamese Evaluator, Dai Ninh Hydropower Joint-evaluation Group with suggestions by Japanese secondary evaluator.

The Vietnam-Japan Joint Evaluation Team 2010 consisted of the two Working Groups each of which evaluated different projects. This project was evaluated by the Dai Ninh Hydropower Joint-evaluation Group joined by the following members:

1. Luong Lan Dung, National Power Transmission Corporation (National adviser)
2. Bui Duc Tho, National Economics University (National consultant)
3. Mai The Cuong, National Economics University (National consultant)
4. Banh Thi Bich Ngoc, Hydropower Project Management Board No 6 (core team member)
5. Nguyen Thi Lan Dai, Hydropower Project Management Board No 6 (core team member)
6. Nguyen Thi Hong Thuy, Hydropower Project Management Board No 6 (core team member)
7. Nguyen Hong Hai, Hydropower Project Management Board No 6 (core team member)
8. Nguyen Dinh Vinh, Dai Ninh Hydropower Plant (core team member)
9. Do Phuong Dung, Ministry of Industry & Trade (core team member)

10. Cao Thanh Phu, Ministry of Planning & Investment (core team member)
11. Pham Minh Hung, Ministry of Planning & Investment (core team member)
12. Nguyen Minh Hai, EVN (core team member)

Management team includes:

1. Le Huu Phuc, Ministry of Industry & Trade
2. Luong Thi An, EVN
3. Luong Van Ket, Ministry of Planning & Investment
4. Cao Manh Cuong, Ministry of Planning & Investment

2.2 Duration of Evaluation Study

Duration of the Study: November 22, 2010 – July 14, 2011
Duration of the Field Study: December 13, 2010 – March 19, 2011

2.3 Constraints during the Evaluation Study

Nether Binh Thuan nor Lam Dong Natural Resource and Environment Department can provide any information on the types and number of wild animals in the project area, the study has no evidence to evaluate this aspect.

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

3.1 Relevance (Rating: 3)

3.1.1 Relevance with the Development Plan of Vietnam

A high priority on power sector development is continuously seen in the Socio-Economic Development Plan (SEDP) of both before and after the project. SEDP 1996-2000 (at the appraisal or ex-ante evaluation stage) emphasized adding to and upgrading power resources and networks in the Industrial Development Program and the Infrastructure Development Program. SEDP 2006-2010 (at the ex-post evaluation stage) gives an even higher priority to power sector development. A priority on hydropower development, which can utilize Vietnam's natural resources and save generation costs, is also stressed.

At the lower level of development plan of EVN, the Master Plan IV 1996-2000 Perspective up to 2010 plans to increase generation capacity from 4,435MW to 19,000MW in 1994-2010. Increasing power generation capacity is again mentioned in the current Master Plan VII 2010-2020, which plans to increase generation capacity up to 54,294 MW, and to construct 50 hydropower plants.

3.1.2 Relevance with the Development Needs of Vietnam

In the period of 1996-2000, Vietnam experienced a high GDP growth rate, an average of 7%[1]. This fast economic development required a rapid increase in electricity demand with an average 14.4% p.a. consumption growth (countrywide) in 1998-2005, higher than estimated at the time of appraisal -- 11.7-14.1% p.a. consumption growth forecast till 2005. GDP of Vietnam continues to grow at a high rate in the period of 2001-2010, an average of 7.2%. This development leads to a high demand forecast, an average of 13.1% p.a. consumption growth forecast till 2020.

Table 1 shows basic indicators of power demand and supply at the ex-ante and ex-post evaluation stage. High demand for power both before and after the project completion can justify the necessity for the development of power resources in the South.

[1] Calculate from Statistical year books 1997-2009, GSO.

Table 1: Basic power indicators

Indicator	Ex-ante evaluation stage	Ex-post evaluation stage
Power consumption and growth rate		
Vietnam	Average 18.1% p.a. consumption growth in 1995-1997	Average 14.4% p.a. consumption growth in 1998-2005 and an average of 13.5% p.a in the period of 2006-2010.
Southern of Vietnam	Average 18.27% p.a. consumption growth in 1995-1997	Average 14.74% p.a. consumption growth in 1998-2010 and an average of 12.73% p.a in the period of 2006-2010.
Installed generation capacity		
Vietnam	20,854 million kWh (1998)	59,088 million kWh (2010)
Demand forecasts		
Vietnam	11.7-14.1% p.a. consumption growth forecast till 2005	Average of 13.1% p.a. consumption growth forecast till 2020
Southern of Vietnam		Average of 13.97% p.a. consumption growth forecast till 2020

Source: EVN and A2

3.1.3 Relevance with Japan's ODA Policy

The ODA Charter of Japan (1992), which defined the overall aid framework at the time of the appraisal of this project, gave priority to assistance in infrastructure development as a prerequisite to socio-economic development. Based on such framework, the Japan's Country Aid Principles for Vietnam (1994-1999) identified five major priority sectors for the implementation of ODA, namely, (i) human resource development/ institutional building, (ii) rehabilitation/ construction of economic infrastructures in the areas of electricity and transport, (iii) agricultural development, (iv) improvement in social services and education, public health and medicine, and (v) environmental protection. The objectives of this project serve (ii) and (iii) above. Also, the Indigenous People Development Program (IPDP) integrated in this project was to serve (iv) and (v) as well.

This project has been highly relevant with the Vietnam 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 project output was produced mostly as planned (see "Comparison of Original and Actual Scope" on the last page of this report). This consisted of six main components: (1) Construction of the Dai Ninh Hydropower Plant with two reservoir and dams; (2) Construction of 500kV substation and expansion of 110kVsubstation; (3) Construction of 220kV and 110kV transmission lines; (4) Consulting services; (5) Development of resettlement sites and Indigenous People Development Program (IPDP); and (6) Development of Resettlement and Rehabilitation Action Plan (RRAP). The summary of the output produced is as follows:

Specification of major project outputs:

- Hydropower plants with 300MW (150MW x 2 units)
- Two reservoirs with total volume of 251 million m^3: Da Nhim reservoir with 66 million m^3; Da Queyon reservoir with 185 million m^3 and a connecting channel.
- Two main dams (earth-fill dams): Da Nhim main dam with height of 56m; Da Queyon main dam with height of 58m.

- Transmission lines: total 90km (44km of 220kV lines and 46km of 110kV lines)
- Substations: New construction of 220/500kV Di Linh Substation (3 x 150MVA) and Extension 110kV Phan Ri Substation 1x16MVA[2] Scope of transmission lines (T/L) and substations (S/S) of the Project are changed due to the adjustment of electric connecting system by the revised Master Power Plan No.V. The new 500kV Di Linh S/S was replaced with extension 2 S/S (Bao Loc, Long Binh) and 2 x 220kV Transmission lines (Dai Ninh-Bao Loc 70.3km and Bao Loc-Long Binh 136.5km)

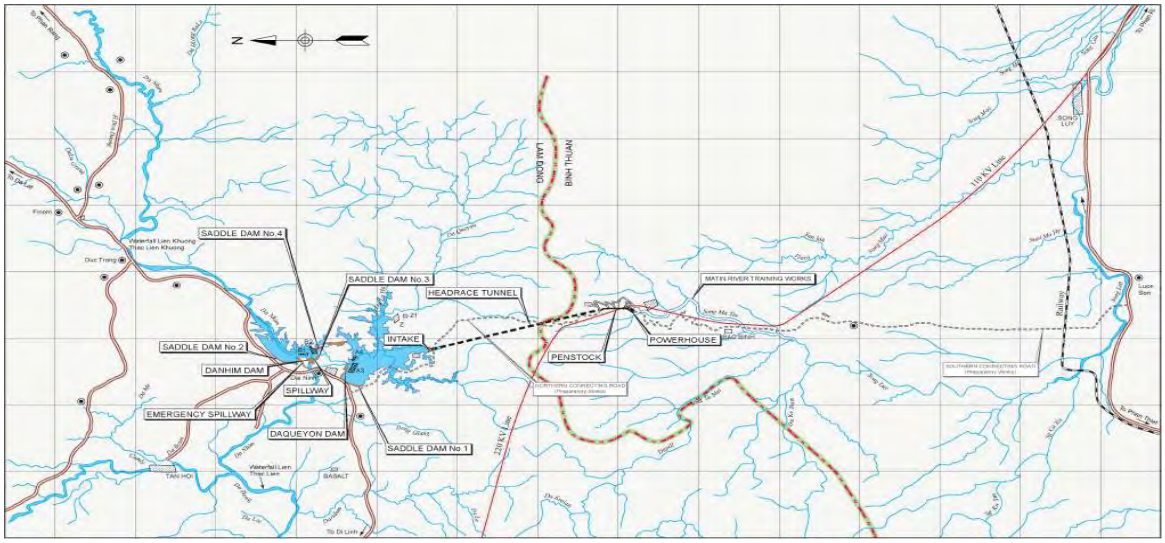


Figure 1: Project general layout

Photo1: Di Linh Substation

Photo 2: Hydropower plants with 300MW (150MW x 2)

[2] The 16 MWA transformer installed by the Dai Ninh hydropower project is not in use until April 2011. It is in use after experts from Siemen came and fixed the problem of compatibility between the transformer and the circus breaker in March 2011.

After the completion of the facilities and equipment of the power plants (as of April 2008), there were some minor problems found (i) Over heating and cracking of cap insulators of generators unit 1&2 (The temperature of cap insulator had been increased to 150-160^{0}C, so the cover of caps have been cracked). (ii) Loose-spacer; (generator's spacers have been loose when the generators operating) (iii) Turbine shaft Coupling (Coupling bolts of turbine shaft and generator shaft has been designed by the Contractor was not compatible with technical requirements); (iv) The communication system between Spillway, intake and Powerhouse (This system had not been yet made commissioning since completed of installation work due to interface between equipment of Hydro-mechanical Equipment (ME1) and Electrical Equipment (ME2) contractor and one Ultra- high frequency (UHF) radio equipment on belong to ME2 contractor was damaged). The Contractor has carried out the repairing works and the deduction of contract price. Up to now, the above captioned outstanding works have been settled by the relative parties as follows:

(i) and (ii): Overheating and cracking of cap insulators of generators Unit 1&2 and loose-spacers have been repaired by the Operation Unit, Dai Ninh Hydropower Company in occasion of yearly overhaul. The Contractor has been agreed to make the compensation fee for this works. Up to now, the Generators Unit 1&2 have been being in the good condition of operation.

(iii): Turbine shaft coupling: EVN hired an Independence Organization named National Research Institute of Mechanical Engineering (Narime), to evaluate the impact of the turbine shaft coupling problems. The existing design of the turbine shaft coupling is sufficient to ensure for endurance and shaft coupling's straight for long-term operation as Narime's review. Besides, 2 set of bolts (20 bolts) for standby were supplied by the Contractor and the Contract price was deducted for this. Up to the stage of this Ex-post evaluation, the turbine has been being in the smooth operation condition.

(iv): The UHF (Ultra high frequency) equipment was repaired by the Contractor however the installation works for this equipment have been not carried out yet by the Contractor until now.
The consulting services were provided mostly as planned. The major tasks were review the detailed designs; assistance in tender and construction supervision. No big problem is reported about the performance of the consultants. The whole actual Man-month (M/M) of the Consultants was 415 M/M for foreigners and 560 M/M for local staff while the planned ones were 336 M/M for foreigners and 554 M/M for local staff.

The IPDP is carried out mostly as planned with 5 development programs namely: Forestry program; Agriculture program; Education Program; Medical program; and Culture program. Detail figures on the output of the IPDP are described in the table "Comparison of the Original and Actual Scope of the Project" at the end of the report.

Development of resettlement sites included 48 houses in Ninh Gia commune, 7 houses in Ta In Commune and 1 house in Phu Hoi commute. Each household has a 400 m2 parcel with a 56m2 house, a well and a rest-room. The resettlement site is well designed with accessing roads, a public welfare house and a local clinic.

Rehabilitation (Agriculture resettlement) areas at Ninh Gia, Ta In and Phu Hoi communes included 220 hectares of reclaiming area with its 3 pump systems (pumps, operation control houses, tanks (100 and 200m^3) and connection pipes) and road in production section.

Photo 3: Resettlement site

Photo 4: Phan Ri substation

Photo 5: Pump for irrigation

3.2.2 Project Inputs

3.2.2.1 Project Period

Using LA1 as the baseline for evaluation, the overall project period was delayed by 39 months (57% of the planned period)[3] in which the period delay of each packages is such as 40months of Consulting service, 13 months of preparatory works, 8 months of Civil works for waterway and powerhouse (CW1) package, 8 months of Civil works for Head-works (CW2) package, 13 months of Hydro-mechanical Equipment (ME1) package, 21 months of Electrical Equipment (ME2) package, 28 months of Supply of Equipment and Material for Transmission Lines (TL1) package, 39 months of Erection for Equipment and Material for Transmission Lines (TL2) package and 28 months of Supply and Erection for Substations and Communication system (TL3) package. The reasons of the delay are as followings:

- The approval procedure and duration by Ministry of Industry (MOI) and relative organizations for results of bidding of consultancy service package, detailed design and additional design, bidding documents and results of negotiation of contracts were long and complicated. As a result these, the subsequence activities for project such as detailed review, additional design, bidding and construction… were shift accordingly.

- Revision of master plan such as adjustment of electric network system due to revision of Power Master Plan V, the scope of works of the project was changed accordingly.

[3] Total project period stated in LA 1 was 70 months, from March 1999 to December 2004. The starting date is the signing LA1 date and the completion date is the starting of the operation of the power plant. However, according to LA 3, the completion date is expected in December 2008.

- The planning schedule in the appraisal stage (time of discussion for Loan Agreement) was based on the Basic detail Design such as the planned schedule for packages of civil works was 47 months in the appraisal stage (L/A) but in the actual these schedules were adjusted to 51 months after detailed design reviewed and bidding document issued.

- During the construction stage, the performance of the Contractor such as ME2, TL3 and TL2 Contractor was not good as expected due to weak of ability in technical and organizational.

3.2.2.2 Project cost

The total actual cost of the project was 38,215 million Yen, which was 23,358 million Yen lower than estimated cost of the project (save 38% of the estimated cost). In which, 19,839 million Yen from JICA portion was saved.

Table 2: Project estimated and actual cost

Unit: Japanese Yen

	Total Estimated Project Cost (LA VNXI-1)	Total Actual Project Cost	Balance
Total	**61,573 million**	**38,215 million***	**23,358 million**
JICA Portion	48,439 million	28,600 million	19,839 million
Gov. Portion	13,134 million	9,615 million	3,519 million

Source: HPMB No.6

Note: (*): This amount included the estimated costs for some remaining issues such as Contractor's claim

Reasons of differences:

- Due to international and local competition bidding helps reducing project costs of some packages such as in the L/A estimated amount for the packages of civil works was 29,552 million JPY and equipments was 12,591 million JPY…but decreased to 17,550 million JPY and 7,378 million JPY, respectively after bidding.

- Fluctuation of exchange rate between JPY and VND in which JPY rate was increased remarkably. While some Contract Prices were calculated by VND so the actual disbursement amounts were lower much than the planned one. The exchange rate in the appraisal stage was 1JPY= 100VND, but in the construction stage was about 1JPY=130VND, that mean the JPY rate increased 30%.

- The cancellation of the first International Competition bidding (IBC) for TL1 package to change to the Local Competition bidding (LBC) and direct appointment and purchase helped to decrease the cost for this package (the first IBC bidding price was 1,123 million JPY but the actual cost was 591 million JPY after this package was divided into 8 small packages and carried out the re-bidding by method of LBC and direct appointment and purchase).

Although the project period extended by 157% as comparison with plan stated in LA1, project cost was saved by 38%, therefore efficiency of the project is fair.

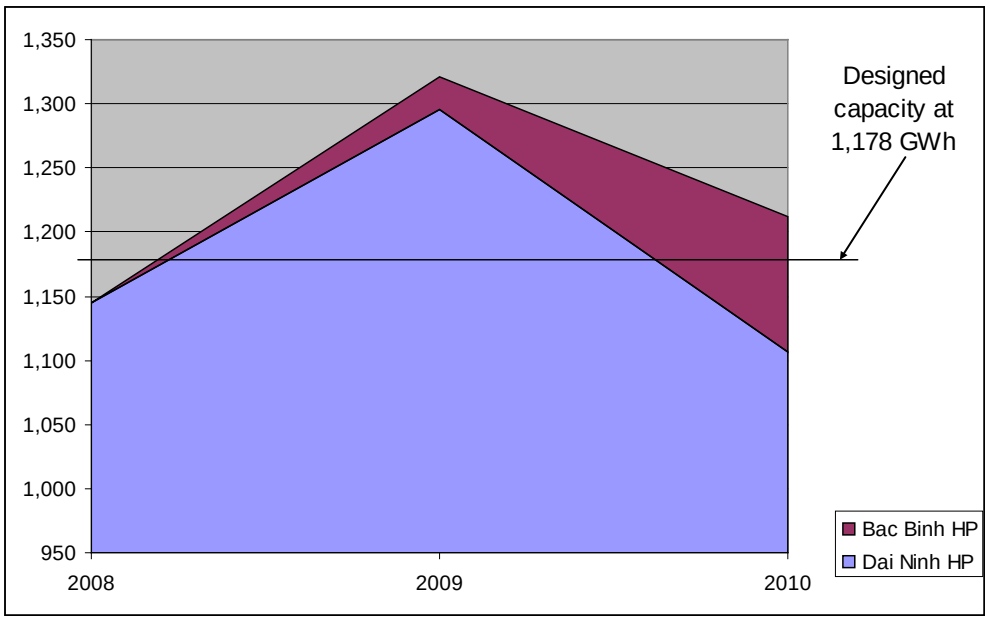
3.3 Effectiveness (Rating: 3)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

+ Increase power supply

Dai Ninh HP achieves its full capacity as planned, 300MW, with two 150 MW generators. After three years of operation, the average annual energy output of Dai Ninh HP is 1,183 GWh/year which is slightly higher than targeted 1,178 GWh/year. The water used at Dai Ninh HP is sent to Bac Binh HP, which EVN constructed on its own resources after this project, for additional power generation (see 3.4 Impact).



Source: Dai Ninh HP

Figure 2: Annual energy output of Dai Ninh and Bac Binh HP as comparison with target

Table 3 shows that even there is a fluctuation of energy output of Dai Ninh HP, the three year average output is higher than targeted. The fluctuation of energy output is mostly due to the amount of rainfall. The two generators of Dai Ninh HP are now in a good condition and expected to work as planned for stable energy output.

Table 3: Target and actual annual energy output of Dai Ninh HP (GWh)

GWh/year	Target annual average as guarantee	Target annual average as design	Actual			Actual average
			2008	2009	2010	
Dai Ninh HP	**862.9**	**1,178**	1,145	1,296	1,107	**1,183**

Source: Dai Ninh report to the questionnaire

+ Enhancing irrigation agriculture in Binh Thuan Province mainly in Bac Binh district

The water used for generation at the Dai Ninh HP was flowed to Bac Binh HP reservoir and then was supplied for irrigation to Binh Thuan province. On average from 2008 to 2010, Dai Ninh supplied 768 million m^3/year for irrigation in Binh Thuan which is slightly higher than designed, 766 million m^3/year.[4] According to the report from Bac Binh Division for Agriculture

[4] As designed, quantity of irrigation water supply = 0.65 m^3/kWh * 862.9 GWh.

and Rural Development, using water from Dai Ninh HP, the number of irrigated hectares increased from the baseline of 7,576 ha in 2007 to 9,372 ha in 2010. The number of irrigated hectares may increase more as the district has planned to develop the channel system to utilize the best of the water resources.

Table 4: Water flow from Dai Ninh to Bac Binh and irrigated hectares in Bac Binh district

	2007	2008	2009	2010
Water supplying from Dai Ninh HPP (mil m^3)	0	746,25	830,21	727,25
Irrigated hectares for agriculture (ha)	7,576	8,032	8,733	9,372

Source: Report of Dai Ninh HP and report of Bac Binh Department for Agriculture and Rural Development

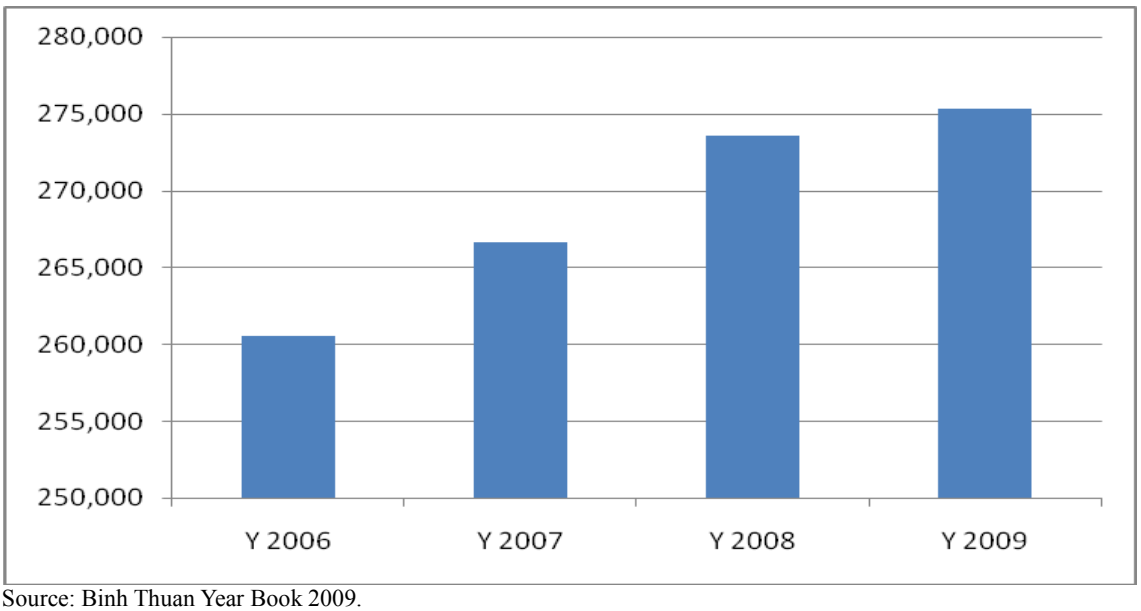
In addition to the amount of water supplying, Dai Ninh HP can help to control the flow of water for not only electric generation but also for irrigation in Binh Thuan. That is the reason why after the project completion, Bac Binh can switch from 1 or 2 crops/year (before the project completion) to 3 crops/year.

The above statistical figures imply that the project has successfully enhance irrigation agriculture in Binh Thuan Province

+ Reclaimed land for agriculture

Using water from Dai Ninh HP, Binh Thuan has been rehabilitated its unused land for agriculture. In Bac Binh district, according to the report of Bac Binh Department for Agriculture and Rural Development, there are 360 ha of rehabilitated land using water from Dai Ninh HP. And according to Binh Thuan Department for Agriculture and Rural Development, they are developing more canals to rehabilitate more land not only for agriculture but also for tourist development. In this aspect, the project achieved its primary purpose and even gets more benefit from the use of water.

Figure 3 shows that the planted area of Binh Thuan has increase sharply right after the project completion in the end of 2007. With a supply of about 768 million m^3 water annually to Binh Thuan, Dai Ninh HP project has directly increased rehabilitated land for agriculture in Binh Thuan.



Source: Binh Thuan Year Book 2009.

Figure 3: Planted area of crops in Binh Thuan (ha)

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

At the appraisal stage, the financial internal rate of return (FIRR) of the project was calculated at 11.9%. The financial costs consist of construction costs, replacement expenses, and operation and maintenance cost (O&M). Financial benefit is the revenue from the amount of electricity generated and sold. For the ex-post evaluation, FIRR was 10.68% which was re-calculated using the actual figures of cost and benefit. This decrease was mainly because of a lower tariff than estimated at appraisal[5]. Although the recalculated FIRR was lower than the FIRR at appraisal, the project was still effective with FIRR greater than 10%.

Economic analysis was made to compare with the replaced thermal power plant. The costs for replaced unit price of the thermal power plant was to be seen that power benefit of the hydropower plant. The re-calculation for Economic Internal Rate of Return (EIRR) was carried out based on the actual conditions which changed such as the increase of investment rate for the thermal power. The result of calculation for actual EIRR is 17.89% while the designed EIRR is 16.15%. In addition, there were other visible benefits such as the road system, especially the benefit from irrigation water for agriculture and forestry which was not included in the above actual calculated figures of EIRR.

3.3.2 Qualitative Effects

+ Improve living standard of indigenous people in the project site

The livelihood of the indigenous people is better as they can participate in the afforestation and forestry protection to get permanent income. They are also guided techniques on breeding chicken, planting rice so that they can get extra income from farming. According to the survey of 75 indigenous people affected by the project, 81% of them believe that they have better livelihood than before the project. In addition, according to Duc Trong People Committee's comments, the IPDP with five programs of forestry, agriculture, health, culture and education brought many positive factors such as better fertilizer, better breeding animal and plant, better varieties and better farming tools helped indigenous people to have better livelihood. And if they have enough irrigation water in the dry season, the indigenous people even can have better income. In addition,, the program of health, culture and education created the better conditions to support the indigenous people in health, culture and condition to improve education.

The result of the survey shows that the indigenous people have better infrastructures, better access to public service, including school, hospital, and market. Before the project, they had a bigger land but a very poor house, often made of low quality wood. They now have much better house with a suitable private toilet and a well for clean water. At the time of site observation, in the middle of dry season, the well has enough clean water for their daily life.

In general, 83% of the indigenous people participating in the survey are satisfied with the IPDP and 71% of them satisfied with the Dai Ninh Hydropower Project. Because of the project they have better living condition.

[5] At the appraisal stage, tariff was assumed to be 7 cent/kWh in 2005 and expected to be 7.9 cent/kWh in 2010. However, the actual tariff was 6.0 cent/kWh in 2010. If the selling price estimated at the appraisal stage were applied, the re-calculated FIRR would have been 14.6%. It cannot be said that the appraisal overestimated the selling price because other similar studies also apply similar rates (around 7 cent/kWh). Electricity prices are under control of the government.

At the appraisal stage, the distribution loss was assumed at 19%, but the actual distribution loss was reduced sharply to 8.5% in 2010. If the distribution loss at 19% was applied, the FIRR would be 10.19%.

Another factor affected the actual FIRR is the financial project cost. It was planned at 396.54 million USD but the actual cost was 321.48 million USD.

Although the recalculated FIRR was lower than the FIRR at appraisal, the project was still effective with FIRR greater than 10%

Box 1: Beneficiary survey

(75 indigenous people representative of their households participate in the survey)

1. Date and place of survey: 18 April, Ninh Gia, Phu Hoi and Tahine commute
2. Objective of the survey: to collect information on the living standard of the indigenous people
3. Survey method: the survey is conducted in two stages
   1) A focus group of 13 indigenous to explore the major impacts of the project to the life
   2) Base on the findings from the focus group interview, a more detailed questionnaire is designed for a larger survey of 75 indigenous from Ninh Gia, Phu Hoi and Tahine.
4. Result of the survey:
   1) How is the current situation in comparison with the situation before the project?

How is the current situation in comparison with the situation before the project?	**Totally agree**	**Agree**	**No ideal**	**Disagree**	**Totally disagree**
Have a better house	24.0%	61.3%	8.0%	4.0%	2.7%
Have better infrastructure	69.3%	14.7%	16.0%	0.0%	0.0%
Lack of water for irrigation in dry season	57.3%	8.0%	20.0%	9.3%	5.3%
Lack of clean water for daily life	8.0%	6.7%	12.0%	45.3%	28.0%
Difficult to divide the resettlement parcel for married sons/daughter	61.3%	21.3%	9.3%	8.0%	0.0%
Better access to public service (school, hospital, market)	52.0%	36.0%	5.3%	6.7%	0.0%
Better community activities	88.0%	12.0%	0.0%	0.0%	0.0%
Better livelihood	64.0%	17.3%	16.0%	2.7%	0.0%

   2) How do you satisfied with the IPDP?

Very satisfied	37	(49.3%)
Satisfied	25	(33.3%)
No ideal	5	(6.7%)
Dissatisfied	6	(8.0%)
Very dissatisfied	2	(2.7%)

   3) How do you satisfied with the Dai Ninh Hydropower Project?

Very satisfied	27	(36.0%)
Satisfied	26	(34.7%)
No ideal	19	(25.3%)
Dissatisfied	2	(2.7%)
Very dissatisfied	1	(1.3%)

The above analysis shows evidence for the improvement in living standard of indigenous people in the project site

One small issue with effectiveness is the use of the pump system for rehabilitation. The pump systems have never been in used for irrigation with two main reasons: 1) No budget for operation and maintenance of the pump systems 2) The design of the pump system was not convenient for farmers uses. In the last part of the report, recommendations are drawn to best utilize this output of the project.

Photo 6: Getting clean water from the well at resettlement site

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

3.4 Impact (Rating: 3)

3.4.1 Impact on economic development

Table 5: GDP growth rate of Vietnam and Binh Thuan, Lam Dong province

GDP growth rate (%)	2005	2006	2007	2008	2009	2010
Binh Thuan	13.40	13.90	12.10	16.20	10.07	11.95
Lam Dong	20.78	18.17	14.35	13.89	12.88	13.3
Vietnam	8.44	8.23	8.46	6.31	5.32	6.78

As described in the table 5 above, GDP of Vietnam and the Southern region of Vietnam have experienced high growth rates. This rapid economic development required a higher energy supply and Dai Ninh HP is considered as a motivated factor to the economic development. Although the project contributes a very small portion directly to GDP of Vietnam, its indirect contribution is high. Electricity is an irreplaceable input for other industries' operation. As a result of the project, electricity supply is increased by 1,226 GWh/year. This increase supports the development of other industries, and indirectly contributes to GDP growth rate of Southern region and of Vietnam. In addition, the project has a strong positive impact on agriculture production of Binh Thuan (ref. + Impact on agriculture development of Binh Thuan and Lam Dong). This is also an indirect contribution to GDP growth of Binh Thuan and Vietnam.

According to people committee of Lam Dong and Binh Thuan, the project can be seen as a key factor supporting the economic development of Lam Dong and Binh Thuan, as well as GDP of Vietnam. The project supported and pushed the process of industrialization and modernization of the two provinces.

3.4.2 Impact on power supply in Vietnam

With the average annual output of 1,226 GWh, the project has contributed to narrow down the gap between demand and supply of electricity of Vietnam. Table 6 shows that the demand site increases sharply, as a result the gap is widened. Thanks to the operation of the Dai Ninh HPP, the electricity demand and supply gap was narrow down by 5% in 2008. In addition to the energy output of Dai Ninh HP, Bac Binh HP[6] with the capacity of 33MW started to supply

[6] Bac Binh HP is the HP which utilizes the water from Dai Ninh HP. Without Dai Ninh HP, there is no reservoir for Bac Binh HP.

electricity in 2009. It supplied an addition of 104.7 GWh in 2010.

From this finding, it can be said that the project has contributed toward a more stable power supply in Vietnam.

Table 6: Gaps between demand and supply before and after project (million kWh)

	2005	**2006**	**2007**	**2008**	**2009**	**2010**
Vietnam demand	51,769	59,014	66,773	74,226	84,756	97,349
Vietnam supply	41,186	46,465	50,001	53,093	57,002	59,088
Vietnam supply without Dai Ninh HPP	41,186	46,465	50,001	51,943	55,702	57,978
Gap without Dai Ninh HPP	10,583	12,549	16,772	21,133	27,754	38,261
Annual power generation by Dai Ninh HPP				1,150	1,300	1,110
Gap with Dai Ninh HPP	10,583	12,549	16,772	19,983	26,454	37,151

3.4.3 Impact on agriculture development of Binh Thuan

As a result of providing more and controlable irrigation water to Binh Thuan, especially to Bac Binh district, Bac Binh paddy production has increase sharply since the operation of Dai Ninh HPP. Table 7 shows that Bac Binh paddy production increase at a very high rate of 31.5% in 2008, the year Dai Ninh HPP started is operation.

Table 7: Bac Binh Paddy production (ton)

Year	2005	2006	2007	2008	2009
Paddy	57,896	59,111	70,934	93,267	113,576
Gowth rate	-	2.1%	20%	31.5%	21.8%

Source: Binh Thuan Year Book 2009

With irrigation water, not only paddy but also other agriculture products were benefited. Although there was no quantitative evidence on the impact of the project to agriculture products of Binh Thuan, according to the interviews with Bac Binh people committee and Binh Thuan people committee, they all agree that the project has pushed up the growth of agriculture in the province. Table 8 showing a constant growth in gross output of agriculture in Binh Thuan.

Table 8: Gross output of agriculture in Binh Thuan

Unit: Mil. VND

Gross output of agriculture at constant 1994 prices	2005	2006	2007	2008	2009
Binh Thuan	2,015,369	2,007,199	2,222,686	2,367,801	2,460,381

Source: Lam Dong and Binh Thuan Year Book 2009

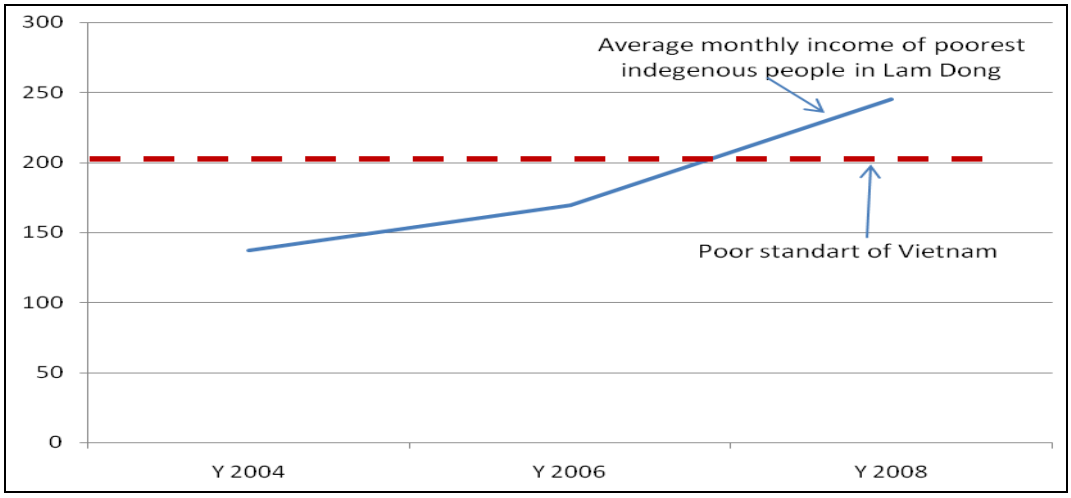
Besides, the discharge water of Dai Ninh Hyropower Plant will be supplied to:

(1) The Bac Binh Hydropower Project has the design capacity of 33MW and annual power generation of 114 million kWh/year. Bac Binh HP has completed in 2009.

(2) The Phan Ri-Phan Thiet Irrigation Project which has been under construction and it is expected to be completed in 2012. This irrigation project funded by Japan ODA serves approximately 15,000 ha of farm in Binh Thuan province.

3.4.4 Impact on living standard of the indigenous people

In order to improve the living standard of the indigenous people in the project site, the project included IPDP and RRAP. According to the report of Lam Dong People Committee, and the report of Hydropower Project Management Board No.6 on compensation and resettlement works, the program attracted almost all the eligibilities, 96,1% indigenous people participate in the program in 2003.



Source: Lam Dong year book 2009

Figure 4: Average monthly income of the poorest (most are indigenous people) in Lam Dong

Figure 4 shows that the average monthly income of most indigenous people in Lam Dong has increased since the implementation of the IPDP in Lam Dong. As a result, their monthly income was higher than national poor standard in 2007.

3.4.5 Environmental Impact

The environmental impact assessment (EIA) for this project was approved by GOV in Dec. 30 1998. According to EIA, the project site was not located in the protected area and no endangered species existed in the area. During construction, the Vietnam Institute for Tropical Technology and Environmental Protection (VIPTEP) who performed monitoring water quality, air quality, noise level and vibration level once a month. After the hand-over, Dai Ninh Hydropower Company performed monitoring water, air, noise and vibration once a year. According to those monitoring results and interviews with the provincial governments and Dai Ninh Hydropower Company, no environmental problem is seen.

Accident Prevention Measures:

- As provided in the contracts, there will be safety team, the member of which is from Employer, Consultant and Contractors. This team shall do frequent safety patrol at project construction sites.

- - A few days before flood discharging is to be operated, the notification in writing shall be informed to local inhabitants living in and vicinity. Before flood discharging, the warning shall be made directly by site in 3 times.

3.4.6 Improvement of Transportation (Impact of Road Construction)

- The infrastructures built for the construction of the project such as roads, bridges contribute much to the development of local area. Ninh Gia, a commute in Duc Trong district, used to be a poor commute but now it develops very fast and the district has a plan to build Ninh Gia as a city within the district. The Luy river bridge and the accessing road (70 km) have reduced traveling time between Lam Dong and Binh Thuan. It becomes a key road connecting Lam Dong and Binh Thuan.

Photo 7: Luy river bridge

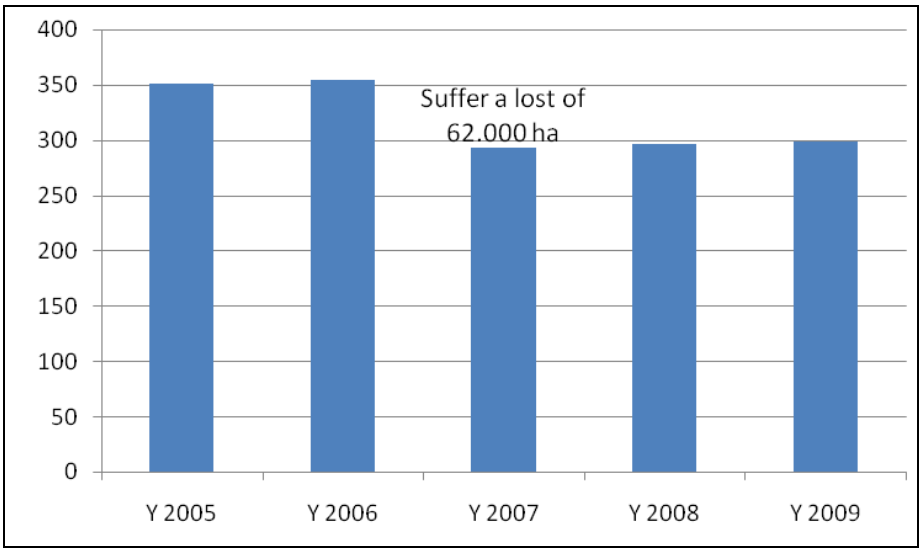
- Before the project, local residents had to cross the river by boat, and no car can run on the road. Luy river brige belong Binh Thuan Province has been constructed by the project.

3.4.7 Land Acquisition and Resettlement Rehabilitation Action Plan (RRAP)

Positive impacts, as discussed in 3.3.2, the indigenous people are better due to the project with five programs of forestry, agriculture, health, culture and education . The major positive impacts are: better living standard, better house and infrastructure, easy access to public service and clean water. Although compensation was provided in accordance with the agreed resettlement plan but the resettlement people complaint about the negative impacts which are lack of water for irrigation in dry season ($0,7m^3/s$) and smaller parcel for their children ($40m^2$ house built in $400m^2$ land)

3.4.8 Unintended negative impact

After the construction of dams had been completed and impounding of reservoirs commenced, the flow regime has been changed considerably. To protect the eco-system and agricultural production of the downstream, the project designed to keep the minimum flow to downstream to be $0.7m^3/s$. However, the Dai Ninh HP Company has discharged of $0.7m^3/s$ to downstream only in the daytime and stop discharging in the night time. As a result, the volume of discharging water is not always sufficient especially in the night time of dry season. It might possible cause the reduction of agricultural production in some area such as Duc Trong and the water shortage of Pongour waterfall.



Source: Binh Thuan year book 2009

Figure 5: Area of forest in Binh Thuan (1.000 ha)

According to Binh Thuan people committee, it was allowed to deforest 400 ha forest to construct Dai Ninh HPP and related facilities. Binh Thuan has its own afforrestation program to recover the area of forest loss by the Project. However, the figure 5 shows a huge loss of forest in 2006-2007 in Binh Thuan and it was not recovered yet. This huge loss of forest is not due to the Dai Ninh HPP but insufficient implementation of afforestation program and forest protection programs in Binh Thuan. This large-scale deforestation can be considered as one of the reason that caused flood in Binh Thuan in 2009 and 2010 which caused the agricultural and human damages in the area.

According to Bac Binh People committee, when it was flooding, Dai Ninh HPP kept to operate at its full capacity which discharged 55m^3/s to Bac Binh. This full capacity operation might make the flood in Bac Binh being more harmful. In 2010, Bac Binh peple committee had more experience in preventing flood and the damages reduced.

3.5 Sustainability (Rating: 3)

3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance of the hydropower plant including reservoir and dams is under responsible of Dai Ninh HP. Dai Ninh HP is a member company of EVN. Its financial and personnel management are depend on the management of EVN. Dai Ninh HP has 6 departments which cover all the activities of the plant. The department of operation has 5 generator operation teams and one dam operation team. These team are well organized to operate the plant 24 hours/day and 365 days/year. In addition, EVN may support personnel and financial if the plant has any problem in operation. Figure 6 shows the organization chart of Dai Ninh HP. In the aspect of structure, it is highly sustainable.

3.5.2 Technical Aspects of Operation and Maintenance

Dai Ninh HP has 116 well trained staff and it is enough for operation and maintenance.

All the equipment has its owned manual and it is operated and maintained as stated in the manual. Although there were some technical problems with the two generators and other facilities, all the problems have been solved. During the process of repairing and maintaining The equipments and facilities of the contractors, Dai Ninh HP technical staff learnt the know-how and technique. Now they can repair the equipment and facilities by themselves.

For example, they learnt the technique to joint cracks on.

Dams in 2008. In 2009, a crack appeared in a dam and they have successfully applied the similar technique to fill in the crack.

Di Linh substation also has enough qualified staff for O&M. Its current 23 staff is well trained and can operate effectively the substation 24 hours/day. The O&M manual is well established and used.

Photo 8: Spare part is under maintenance

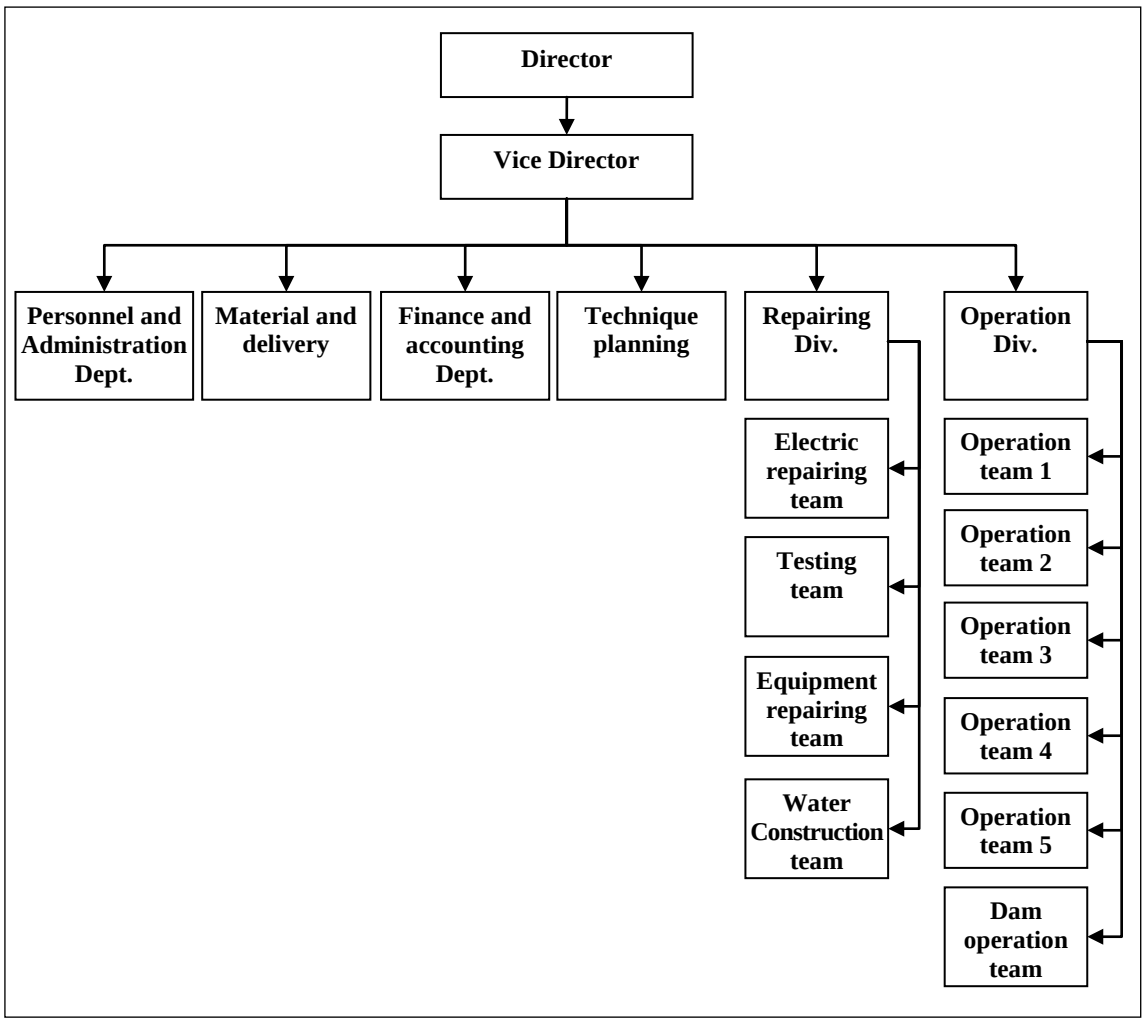


Figure 6: Organization chart of Dai Ninh HP

3.5.3 Financial Aspects of Operation and Maintenance

Dai Ninh HPP yielding a positive profit since operation. Table 9 shows that revenues of Dai Ninh HPP can cover all expenses including O&M cost. It gained 18,516 million. VND profit in 2009 and 136,841 million VND profit in 2010. This earning means that the project has a sustainable financial aspect.

Table 9: Main items in income statement for financial year 2009-2010 of Dai Ninh

Unit:mil. VND

Items	2009	2010
Total revenues	331,639	1,175,157
Total cost of good sold	306,952	992,703
Net profit from operation	24,687	182,455
Gross profit before tax	24,687	182,455
Profit after tax	18,516	136,841

Source: Dai Ninh income statement for financial year 2009-2010, provided by EVN

3.5.4 Current Status of Operation and Maintenance

As a result of the site observation and report of Dai Ninh HP, Phan Ri and Di Linh substation, all the equipments are in good condition. They have enough qualified staff for operation and maintenance. All the equipments, facilities are maintained regularly in accordance with the O&M manual. The plant, the dams and substations are operating properly.

3.5.5 Current status of using the houses and agriculture land of settlement

Infrastructures of the houses in resettlement site are in good condition. The access road to the existed houses in resettlement site is much better than the access road to their houses which they had before the project. The agriculture resettlement areas at Ninh Gia, Ta In and Phu Hoi communes of Lam Dong Provinces were handed over to the affected households and now it has been used mainly to plant the coffee trees.

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

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

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

4.2 Recommendations

4.2.1 Completion of all project components

* The relative parties such as Dai Ninh HPP Company, the Contractor and HPMB No.6 should continue measures to solve the problems of the communication system between Spillway, intake and Powerhouse as captioned in the Item 3.2.1 above.

* The local authorities of Lam Dong Province should check and solve problem of the pump systems at rehabilitation sites in Ninh Gia, Ta In and Phu Hoi communes seeking advice from HPMB6 as mentioned above.

4.2.2 Improvement of the operation system

* It was found that in the dry season, downstream of dam lacked of irrigation water. Therefore, it is recommended that the Dai Ninh HP should strictly commit to discharge $0.7m^3/s$ or higher in full time basis (24 hours/day) to the downstream. In addition, Duc Trong People committee need to built a reservoir at downstream of the dam to save water for irrigation.

* When it is flooding in Binh Thuan at warning level 2 or above, Dai Ninh HP should report to National Load Dispart Center (NLDC-A0) to ask for lower operation capacity.

* Binh Thuan People committee should invest more on afforestation program and forest protection program to recover the forest to prevent flood.

4.3 Lessons Learned

4.3.1 Project preparation

a) Land acquisition, compensation and resettlement

- In this project, the land acquisition, compensation, resettlement stage 1 except reservoir, T/L & 500kV Di Linh S/S completed in April 2003 before requesting JICA concurrence and commencement of construction of the contract of civil works. Due to this convenience, the lots of civil works had been implemented smoothly and had no claim which relative with land acquisition occurred. Future project could follow this good practice as a means to improve effectiveness and impact.

- Land acquisition and compensation carried out well due to support of local authority and related agencies. The following considerations that the project took could be good practices for future projects:
  - Encourage people to understand government policies on hydropower construction;
  - Create all the favorable conditions in land acquisition as follows:
    + A Land acquisition and compensation Council was established at the affected Districts in Project site for managing the land acquisition and compensation process.
    + A task force was established to handle the forest tree issue to acquire land in a timely manner for construction.
    + The compensation and support scheme was quickly appraised and approved to speed-up the disbursement to the local people.
    + All the obstacles had been solved in a timely manner by the local authorities.
  - Maintenance of a regular good relationship with the province, district and commune People Committees, in a spirit of cooperation and collaboration to fulfill the tasks.
  - All the obstacles should be discussed and solved with mutual understanding and concerns based upon the government's policies and regulations.

b) In this project, indigenous people got a sustainable support to compensate for their change of life due to the project. As a result, the project gets much consensus from both local government and residents. Therefore, similar projects on hydropower plant should support indigenous or affected people in a sustainable way—not only compensate them by other land, resettlement site, money but also support them in education, health care, culture… so that they can get on well with the changing life.

c) The design and construction works for rehabilitation areas with its facilities such as pumps systems, tanks and control houses should taken in account with respect of the habit of doing in agriculture production and the convenience in use of the affected local residents and farmers, so that the effectiveness for the rehabilitation areas could be improved more.

4.3.2 Implementation

With the participation of operation agencies in the soon construction stage (i.e. as a

member of the interim operation management board), experience was enriched for O&M. Future Projects could follow this good practice as a means to improve sustainability.

4.3.3 Operation and maintenance

In the early operation stage, there often occur technical problems, so the coordination between the Employer (including Management Unit and Operation Unit) and the Contractor should be closely to solve the problem better. It is necessary to present the Contractor's engineers in the early operation stage at the site even the installation works were completed in order to have a smooth operation and commissioning.

Comparison of the Original and Actual Scope of the Project

Items	Unit	Plan (L/A dated March 30, 1999)	Actual
1. Outputs			
(1) CIVIL WORKS			
a) Waterways			
Inlet Canal Length	m	1600	1789
Headrace Tunnel Length	m	10 795	11 258
Surge Tank Height	m	129.45	130
Powerhouse		Surface	Surface
Tailrace Gallery Length	m	682	715
Tailrace Canal Length	m	247.5	184
River Training Length *	m	-	9800 *
b) Head works			
Connecting Canal Length	m	2550	2530
Da Nhim Dam			
Type		Earth fill	Earth fill
Crest Length	m	415	420
Height	m	56	56
Da Queyon Dam			
Type		Earth fill	Earth fill
Crest Length	m	1725	1688
Height	m	58	58
Spillway			
Gated	unit	3	3
Height	m	18	18.5
Width	m	15	15
Emergency Spillway			
Type		Fuse dykes	Fuse dykes
Crest Length	m	82.8	82.8
Bottom Width	m	17	32
Height	m	12.7	12.7
Saddle Dam No.1			
Type		Earth fill	Earth fill
Crest Length	m	1200	1217
Height	m	19.3	22
Saddle Dam No.2			
Type		Earth fill	Earth fill
Crest Length	m	2090	2096
Height	m	15	17
Saddle Dam No.3			
Type		Earth fill	Earth fill
Crest Length	m	520	517
Height	m	30	31
Saddle Dam No.4			
Type		Earth fill	Earth fill
Crest Length	m	185	186
Height	m	32	35

Items	Unit	Plan (L/A dated March 30, 1999)	Actual
(2) EQUIPMENT			
a) Hydro mechanical Equipment			
Penstock			
Diameter	m	3.2	3.2
Length	m	1787	1820
b) Electromechanical Equipment			
Turbine Type		Pelton 6 Nozzles x 2	Pelton 6 Nozzles x 2
Generator	MW	150 x 2	150 x 2
Main Transformer			13.8/242kV, 180MVA
Transformer Switchyard Equipment			
(3) TRANSMISSION LINES AND SUBSTATIONS			
a) 220kV Transmission Lines:			
Construction of	km	Dai Ninh Powerhouse-Dai Ninh Switchyard, 2xACSR330, 2xS/C 1,2km	Dai Ninh Powerhouse-Dai Ninh Switchyard, 1cct x ACSR330, 0.6km x 2 routes
Construction of	km	Dai Ninh Switchyard - Bao Loc Substation, D/C 2xACSR330, 70.3km	Dai Ninh Switchyard - 220kV Di Linh S/S, 1x ACSR330, 40.8km
Construction of	km	Bao Loc Substation - Long Binh Substation, S/C 2xACSR330, 136.5km	Connection section for existing line (220kV Da Nhim S/S - Bao Loc S/S) 2cct x ACSR 410, 2.1km
b) 220kV Substation			
Extension		Bao Loc Substation 220kV feeder bay 3cct	
Extension		Long Binh Substation 220kV feeder bay 1cct	
c) 110kV Transmission Line			
Construction of	km	Dai Ninh Switchyard - Phan Ri Substation S/C 1xACSR185, 12.2km	Dai Ninh Switchyard - Phan Ri Substation S/C 1xACSR185, 46km
d) 110kV Substation			
Extension		Phan Ri S/S	
		110kV feeder bay, 1cct	110kV feeder bay, 1cct
		110kV transformer bay, 1 cct	110kV transformer bay, 1 cct
		Transformer 110/22kV 3 phase x 1 x 16 MVA	Transformer 110/22kV 3 phase x 1 x 16 MVA
		22kV feeder bay, 4cct	22kV feeder bay, 4cct
e) 500kV Substation (New construction)			500kV Di Linh Substation
Main Transformer 500/220/22kV			1phase x 3 x 150/150/50MVA x 1 banks
Outdoor type bus - bar			Double bus-bar system with transfer bus-bar
500kV			(i) 2 bays for line to Pleiku S/S and Tan Dinh S/S. (ii) 1 bay for 500/220kV Main Transformer
220kV			(i) 2 bays for line to Dai Ninh HPP

Items	Unit	Plan (L/A dated March 30, 1999)	Actual
			(ii) 2 bay for line from Da Nhim HPP and Bao Loc S/S. (iii) 1 bay for 500/220 kV main transformer. (iv) 1 bay for the connecting breaker.
f) Communication System:			
		PLC equipment and the related facilities	PLC equipment and the related facilities
(4) CONSULTING SERVICE			Review of Detail Design, RRAP, IPDP and Tender Documents
			Review of Feasibility Study for Transmission Line and Substation, preparation of Detail Design and Tender Documents
			Additional design
			Additional design was prepared on basis of the review of Detail Design and Tender Document
			Revision of design and Bidding document for Transmission Lines
			Support for procurement
(5) INDIGENOUS PEOPLE DEVELOPMENT PROGRAMS (IPDP): IPDP have had 5 programs:		Implementation of IPDP follows the updated schedule and contents in closed collaboration with the relative Local Compensation Councils and authorities	Contract supervision 1. Forestry program: - Afforesting program: 1983ha - Protecting Forests: 28560ha 2. Agriculture program: - Experiment of Chinese high quality Khang Dan 18 rice: 440kgs - Experiment of Chinese chicken of Luong Phuong: 900 chickens - New Corn planting: 84kgs - Sind Cow : 52 3. Education Program: - Awards: 2370 students - Scholarships: 1890 students - Training for the Ethnic Minority teachers: 165 teachers - King Teachers study K'ho language: 153 teachers 4. Medical program: Provide the protein medicine free for: - Malnourished children: 1406 children - For Pregnant and lactation women: 1729 women 5. Culture program: Build up - 2 Cultural centers at the 2 communes of Ninh gia and Tahine - 3 traditional houses at 3 schools at the 3 communes of

Items	Unit	Plan (L/A dated March 30, 1999)	Actual
			Ninh Gia, Tahine and Phu Hoi.
(6) DEVELOPMENT OF RESETTLEMENT AND REHABILITATION ACTION PLAN		The number of PAHs, crops and areas affected by the Project must be re-counted by the Local compensation Councils before land acquisition and compensation implementation	- Resettlement: 255 households (HHs), including to 139HHs received money, 57HHs resettlement, 67HHs land to built. - Rehabilitation: 220hectares
2. Project Period		March 1999 – December 2004 (69 months)	March 1999 – April 2008 (109 months)
3. Project Cost			
Amount paid in Foreign currency		40,126 million yen	28,600 million yen
Amount paid in Local currency		2,144,663 million dong (equivalent 21,447 million yen)	1,250,000 million dong (9,615 million yen)
Total		61,573 million yen	38,215 million yen
Japanese ODA loan portion		48,439 million yen	28,600 million yen
Exchange rate		dong 1= yen 0.01 (October, 1998)	Dong 1 = yen 0.013 (Average between 1999 and 2008)

Note: (*) The scope of work for Matin River Training changed much due to additional design.

Vietnam

Ex-Post Evaluation of Japanese ODA Loan Project
"Da Nhim Power System Rehabilitation Project"

Nobuyuki Kobayashi, OPMAC Corporation

0. Summary

This project has been highly relevant to the development plan and development needs of Vietnam, as well as to Japan's ODA policy. The implementation of this project required more time than planned because of several reasons including a delay in the selection of consulting services and the careful preparation and examination of the detail design. Since the Gross Electricity Energy Production, a key performance indicator for a power station, fully met its target, the Da Nhim power station can be seen to have played a critical role under the conditions of tight supply and demand. Several mechanical troubles have occurred in the last few years but they had not prevented the operation of the Da Nhim power station at the time of the ex-post evaluation. In light of the above, this project is evaluated to be satisfactory.

1. Project Description

Project Site

Da Nhim Power Station Turbine and Generator

1.1 Background

The Da Nhim Power Station, the power station which was rehabilitated by this project, is a mid-sized hydropower station with a generation capacity of 160 MW in Ninh Thuan province in the southern part of Vietnam. The hydropower station, including the Dran Dam, was built with Japanese post-war compensation and its operation began in 1964. Deterioration of the power station facilities caused operational problems in the late-1990s as by then the power station had been run for more than thirty years. The transmission and transformation facilities from the Da Nhim Power Station to Ho Chi Ming City (HCMC), a major consumption centre of electricity, were damaged in the Vietnam War but only a makeshift repair was carried out.

As Vietnam experienced economic growth after the implementation of the Doi Moi reforms in the mid-1980s, electricity demand increased rapidly. In the 1990s, generation capacity did not sufficiently meet the increase in electricity demand and the lack of electricity became severe, especially in the southern part of Vietnam. After high-capacity transmission lines between the north and the south were completed in 1994, power interchange from the north was made possible and supply and demand of electricity temporarily eased. However, it was foreseen that economic growth in the north would stimulate electricity demand and that the shortage of electricity in the south would be significant in the near future.

As tight supply and demand in the south was expected, rehabilitation of the Da Nhim power station and the transmission lines to HCMC became an urgent task to maintain a stable supply of electricity. This project supported the executing agency (Electricity of Vietnam, EVN) in coping with this task through the provision of an ODA loan.

1.2 Project Outline

The objective of the Project is to recover a stable operation of the Da Nhim power station and transmission/transformation facilities by rehabilitation work on these facilities, thereby contributing to the reliability of the power supply and the development of the regional economy in the southern region of Vietnam.

Approved Amount/ Disbursed Amount	7,000 million yen / 3,935million yen
Exchange of Notes Date/ Loan Agreement Signing Date	January 1997 /March 1997
Terms and Conditions	Interest Rate: 2.3% Repayment Period:30 years (Grace Period: 10 years) Conditions for Procurement: General Untied
Borrower / Executing Agency	The Government of the Socialist Republic of Vietnam / Electricity of Vietnam
Final Disbursement Date	June 2007
Main Contractor (Over 1 billion yen)	Toshiba (Japan)・Nissho Iwai[1] (Japan) (JV), Mitsubishi Electric (Japan)・Mitsubishi Corporation (Japan) (JV)
Main Consultant (Over 100 million yen)	Nippon Koei (Japan)
Feasibility Studies, etc.	"Feasibility Study on the Rehabilitation of the Da Nhim Power System" (JICA, June 1995)
Related Projects	―

2. Outline of the Evaluation Study

2.1 External Evaluator

Nobuyuki Kobayashi, OPMAC Corporation

2.2 Duration of Evaluation Study

Duration of the Study: November 2010 – September 2011

Duration of the Field Study: January 9, 2011 – January 20, 2011, April 17, 2011 – April 22, 2011

2.3 Constraints during the Evaluation Study

Water runners at the Da Nhim Power Station had deficiencies and repair works were being planned at the time of the ex-post evaluation. Further technical knowledge was required for assessment on the recurrence of these deficiencies. An additional assessment after a certain period of operation is recommended.

[1] At the time that the main contact was signed.

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

3.1 Relevance (Rating: ③)

3.1.1 Relevance with the Development Plan of Vietnam

The Socio-Economic Development Plan (SEDP) 1996-2000, the national development plan at the time of the appraisal, identified 12 development programmes in order to overcome social and economic issues in Vietnam. Out of these programmes, the Industrial Development Programme and the Infrastructure Development Programme saw the upgrading of both power resources and the grid network as important tasks in the plan period.

In order to achieve the development goals of the SEDP 1996-2000, the Master Plan on National Electric Power Development (Fourth Stage) first assessed investment needs. Based on the analysis of supply and demand up to 2010, it was planned that generation capacity would be increased from 4,435 MW (1994) to 19,000 MW (2010) and high voltage transmission lines constructed for 10,588 km in the same period.

In the SEDP 2011-2015, the national development plan at the time of the ex-post evaluation, it was considered that fiscal infrastructure was an obstacle to social and economic development. It was pointed out in the plan that, in the power sector, the power generation and transmission systems did not satisfy the demands of industries and households. Large and complex works for the development of energy sources such as hydropower plant was one of the priority investments.

Similar to the development strategy in the SEDP 2011-2015, the Master Plan on National Electric Power Development (Sixth Stage) planned an increase in generation capacity from 12,357 MW (2005) to 42,000 MW (2015). Hydropower will maintain an approximate 40% of the total capacity from 2005 to 2015 and remains one of the major sources of electricity during this period. In the Master Plan on National Electric Power Development (Seventh Stage) it is forecasted that hydropower (excluding small hydropower) will account for approximately 30% of the total generation capacity in 2015[2]. This is next only to coal-fired thermal. A lack of funds has resulted in a slower development of generation capacity, especially for that of hydropower. However, an expansion of the generation capacity of hydropower is being planned.

This project was relevant to the national and sector policies in Vietnam at both the times of the appraisal and the ex-post evaluation. The Vietnamese government had been concerned that the lack of electricity supply might limit social and economic development since the mid-1990s. Given a rapid growth in electricity demand, upgrading power stations and transmission lines remained an urgent task. The development of hydropower will continue to be a priority investment until 2015. Hydropower is expected to be a major source of energy next only to coal-fired in terms of generation capacity. Investment in hydropower was still being planned at the time of the ex-post evaluation.

3.1.2 Relevance with the Development Needs of Vietnam

At the time of the appraisal, the Da Nhim power station, which commenced operation in 1964, had become obsolete and had had serious mechanical troubles for three months in 1996. For this period, power generation had to be reduced despite an increase in electricity demand. The Feasibility Study on the Rehabilitation of the Da Nhim Power System, which was prepared by JICA, assumed that maintenance would require a longer outage which was expected to reach a quarter of annual operation without a major rehabilitation in 2010. The Da Nhim power station, with its capacity of 160 MW, accounted for 3.6% of the installed capacity of Vietnam (4,480 MW, 1995) and 10.7% of that of the southern region (1,491 MW, 1995) It thus had a vital role in the stable supply of electricity in the southern region of Vietnam at that time. Similarly, the grid line between the Da Nhim power station and HCMC had been used without major

[2] Although the Mater Plan (Seventh Stage) was not approved at the time of ex-post evaluation, it contains notable changes in sector policy. For this reason, the report mentions the seventh stage as well as the sixth stage.

rehabilitation work for more than 30 years. Only makeshift repairs for damages caused by the Vietnam War had been implemented.

Photo 1: Da Nhim Power Station

In 2009, the Da Nhim power station accounted for 0.9% of the installed capacity in Vietnam (18,481 MW) and 1.5% of that in the southern region (10,723 MW)[3]. The generation capacity in Vietnam had been expanded as the power consumption grew almost six fold from 1996 to 2009 [4]. For the period 2006-2010, however, investment in power generation facilities lagged behind that planned. At the time of the ex-post evaluation, supply and demand of electricity still remained tight. Potential hydro energy in Vietnam was estimated to be 20.6 GW in terms of generation capacity[5]. At the end of 2009, approximately 30% of the potential hydro energy had been developed. There was still a substantial potential for the development of hydropower.

This project was relevant to the development needs of Vietnam at the both time of the appraisal and the ex-post evaluation. As the generation capacity in Vietnam expanded, the percentage of the Da Nhim in the total generation capacity became more marginal. Nevertheless, the Da Nhim power station still played a critical role under the tight supply and demand conditions. Vietnam had rich resources of hydro energy and hydropower was still underdeveloped. It can be concluded that fully utilizing this potential under the tight supply and demand conditions matched the development needs of Vietnam.

3.1.3 Relevance with Japan's ODA Policy

Japan's Official Development Assistance (ODA) Charter, the preceding charter, which was approved in 1992, referred to the close relationship between Japan and East Asia, including ASEAN, and placed a special emphasis on assistance to the Asian region. The charter prioritized assistance in infrastructure development. In the ODA Annual Report for FY 1996, the country assistance strategy for Vietnam set out four priorities including infrastructure development in both the power sector and the transport sector. In particular, ODA loans were expected to play a vital role in the infrastructure development of these sectors.

At the time of the appraisal, Japan's ODA Charter placed importance on both assistance to Asian countries and on infrastructure development. Furthermore, the country assistance strategy emphasized assistance specifically in the energy sector. The project has been consistent with Japan's ODA Policy as it assists with infrastructure development in a power sector in the Asian region.

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

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

At the time of the appraisal, the project scope was expected to be procured in 4 packages. As project implementation was delayed, the key assumptions such as electricity demand and commodity prices changed drastically and this resulted in the changes in project scope. The

[3] Based on data provided by the Da Nhim-Ham Thuan -Da Mi Hydropower Company (DHD), a subsidiary of EVN.
[4] Based on the appraisal document and EVN Corporate Profile 2009-2010.
[5] JICA "The Study on the National Power Development Plan for the Period of 2006-2015, Perspective up to 2025" (2006)

entire project scope under the Lot 4 was excluded from the scope of the ODA loan. In March 2003, Thu Duc (Saigon) substation was excluded from the scope of the ODA loan. Electricity demand in HCMC increased more rapidly than the forecast in the Feasibility Study (F/S). EVN improved the substation with a larger transformer capacity. In January 2006, 230 kV Transmission from the Da Nhim power station to HCMC was excluded from the scope of the ODA loan. During the tender process, one bidder was chosen from two bidders. However, the contract negotiation did not reach an agreement due to a difficulty in price negotiation. The bid price was above cost estimate. In addition, this rehabilitation work became less urgent as an alternative transmission line (500 kV transmission line from Di Linh station) was completed.

Table 1: Project Output (Planned and Actual)

Planned (At the Time of Appraisal)	Actual (At the Time of Ex-post Evaluation)
1. Revaluation of Da Nhim Power Station	
Lot 1: Generator and ancillary facilities (4 units) and substation facilities for the Da Nhim power station	Almost as planned with minor modifications. Some parts required full replacement instead of repair works.
Lot 2: Water turbine and ancillary facilities (4 units) and waterway and ancillary facilities	Almost as planned with minor modifications. Some parts required full replacement instead of repair works.
Lot 3: Hydrological data acquisition system (6 rainfall gauging stations, 2 water level gauging stations, 2 repeater stations,4 warning systems, data processing system, etc.)	7 rainfall gauging stations, 4water level gauging stations, 1 repeater station, 4 warning systems, data processing system, etc.
2. Rehabilitation of Thu Duc (Saigon) Substation and 230 kV Transmission Line	
Lot 4: Saigon Substation and 230 kV Transmission Line (257 km from Da Nhim power station to HCMC)	Excluded from the scope of the ODA loan.
3. Consulting Services	
Scope of Service: detailed design, tender documents, assistance in tendering, construction supervision Input: International 106 M/M	Scope of Service: detailed design, tender documents, assistance in tendering, construction supervision Input: International 53.167 M/M and Domestic 77.8M/M

Source: DHD and the Project Completion Report

At the time of the ex-post evaluation, the status of the transmission line between Da Nhim hydropower plant and the Thu Duc (Saigon) substation, which was originally included in the project, was as following:

(1) Thu Duc - Long Binh: improved in 2005
(2) Long Binh - Bao Lock: to be improved by the end of 2011.
(3) Bao Lock - Di Linh -Da Nhim: makeshift repairs

The section between Bao Loc and Di Linh faced a capacity constraint but an alternative transmission line (500 kV transmission line from Di Linh substation) allowed rerouting.

3.2.2 Project Inputs

3.2.2.1 Project Cost

Reflecting the exclusion of the rehabilitation works for the Thu Duc (Saigon) substation and the 230 kV transmission line, the cost estimate was adjusted to JPY 7,148 million. The actual project cost was JPY 4, 679 million. The project cost was lower than planned (65% of the cost estimate). For all procurement packages, in particular for the Lot 1, actual costs were lower than the cost estimate at the time of appraisal. According to the executing agency, competition resulted in a reduction of project costs.

3.2.2.2 Project Period

The project period was significantly longer than planned (192% of the original plan). Firstly, the additional study related to the F/S was carried out by the Vietnamese government, though the F/S was approved in November 1997. The prolonged approval process of the additional study delayed the selection of consultants. Secondly, the prolonged preparation and approval process of the detailed design (D/D) also affected the implementation period. As this project was the first large scale rehabilitation project in Vietnam and did not allow detailed inspection until the D/D, the technical specification of the rehabilitation work needed to be carried out within the scope of the D/D. After the preparation of the D/D, both EVN and the Ministry of Industry carefully reviewed the D/D, in particular the scope of rehabilitation work, in terms of the financial and technical aspects. Given these factors, it was presumable that the original schedule underestimated the time for the preparation and approval of the D/D. Lastly, a delay in the completion of other power plants indirectly affected the D/D and the rehabilitation works of the Da Nhim power station. The executing agency could not stop plant operation for a smooth implementation of the project due to the lack of generation capacity.

Table 2: Project Implementation Schedule (Planned and Actual)

	Planned (At the Time of Appraisal)	Actual (At the Time of Ex-post Evaluation)
L/A Signing	March 1997	March 1997
Selection of Consulting Services	December 1996 - April 1997	June 1998 - June. 1999
Detailed Design	May 1997 - October1997	June 1999 - December 2000
Procurement of Main Contracts	November 1997 - July 1998	April 2002 - June 2004
Rehabilitation Works[6]	August 1998 - May 2001	June 2003- August 2006
Project Completion	May 2001 (51 months)	August 2006 (98 months)

Source: DHD

Although the project cost was within the plan, the project period was exceeded, therefore the efficiency of the project is fair.

3.3 Effectiveness (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

(1) Energy Production

The Da Nhim-Ham Thuan - Da Mi Hydropower Company (DHD), a subsidiary of EVN, was operating the Da Nhim power station at the time of the ex-post evaluation. The Financial Rate of Return (FIRR) at the time of the appraisal assumed that Gross Electric Energy Production would reach 943.3GWh (1979-1993 Average) after the completion of rehabilitation works. This assumption was considered a target level for power generation at the ex-post evaluation. The rehabilitation works resulted in an reduction of Gross Electric Energy Production in 2005 and 2006. Gross Electric Energy Production had been above the target since the completion of the retaliation works in 2006. Time Utilization had reached pre-implementation level since 2008 and this shows stable operation of the power station.

[6] The detail design and manufacturing the equipment of the main contract is included.

Table 3: Key Performance Indicators

	Gross Electric Energy Production (GWh)	Time Utilization* (%)	Water Inflow to Reservoir (million m^3)
1996	1,129.094	97	1,189
1997	1,083.889	93	630
1998	1,160.052	95	1,189
1999	1,325.704	95	1,471
2000	1,289.394	98	1,112
2001	1,052.571	92	570
2002	808.997	93	492
2003	945.715	95	599
2004	761.130	98	359
2005	539.434	69	667
2006	1,016.717	73	563
2007	1,163.593	88	676
2008	1,209.156	96	825
2009	1,239.611	95	750
2010	1,226.708	96	961

Source: DHD
Note: * Generators only.

(2) Planned and Unplanned Outages

The Da Nhim power station has experienced unplanned outages several times in the last three years, though these outages did not seriously affect Time Utilization of the power station. Mechanical troubles in 2008 were due to a malfunction of the control boards procured by this project. DHD learned from actual practice in the Dai Ninh power station and fixed this problem. The incident in 2010 was caused by water runners.

Table 4: Planned and Unplanned Outages

		2008	2009	2010
Unplanned: Human Error	Times		1	
	Hours		2h 54 min.	
Unplanned: Mechanical Troubles	Times	8		1
	Hours	9h 34min.		79h 27min.
Planned	Times	6	5	4
	Hours	1,416	1,920	1,032
Total	Times	14	6	5
	Hours	1,425	1,922	1,111

Source: DHD

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

The FIRR for this project is 5.49% (for the rehabilitation of the power plant only) which is below the comparable forecast at the time of the appraisal (12.65%). As the FIRR is marginally higher than the Cost of Capital (5.03%)[7], this project is financially viable. The assumptions for the FIRR are as follows:

[7] Weighted Average of the ODA loan financial costs of this project and lending rate in Vietnam based on IMF "International Financial Statistics 2009"

Table 5: Assumptions for FIRR

	At the Time of Appraisal (1997)	At the Time of Ex-post Evaluation (2011)
Costs	Investment cost, O&M cost, Tax, Energy loss	Investment cost, O&M cost, Tax (The same data is used for Tax due to the lack of detailed calculation methods)
Returns	Additional Energy Sales, O&M benefits (an reduction in O&M Costs), Renewal benefits	Additional Energy Sales, O&M benefits, Renewal benefits (The same data is used for Renewal benefits due to the lack of detailed calculation methods
Project Life	50 years (45 years after completion, up to 2046)	55 years (45 years after completion, up to 2051)

Source: JICA "Feasibility Study on the Rehabilitation of the Da Nhim Power System", DHD

There are some notable changes from the forecast at appraisal. While smaller investment costs and increased energy production contribute to financial gains, lower unit prices for electricity and negligible gains from O&M benefits are negative for the profitability of this project.

3.3.2 Qualitative Effects

(1) Hydrological data acquisition system

The hydrological data acquisition system installed rainfall gauging stations (RS 1-7 on Figure 1) and water level gauging stations (WL 1-4 on Figure 1) across the water basin of the Da Nhim River. Data from these gauging stations are used for the forecast of water levels at the reservoir. With these forecasts, the dam operator can pre-emptively discharge water before the water level rises. DHD had a similar system before the implementation of this project but the number of gauging stations was fewer. According to DHD, forecasts from the new system are more reliable than before. This system improved the accuracy of forecasts and prevented sudden discharges of water, which may have affected residents near the Da Nhim River.

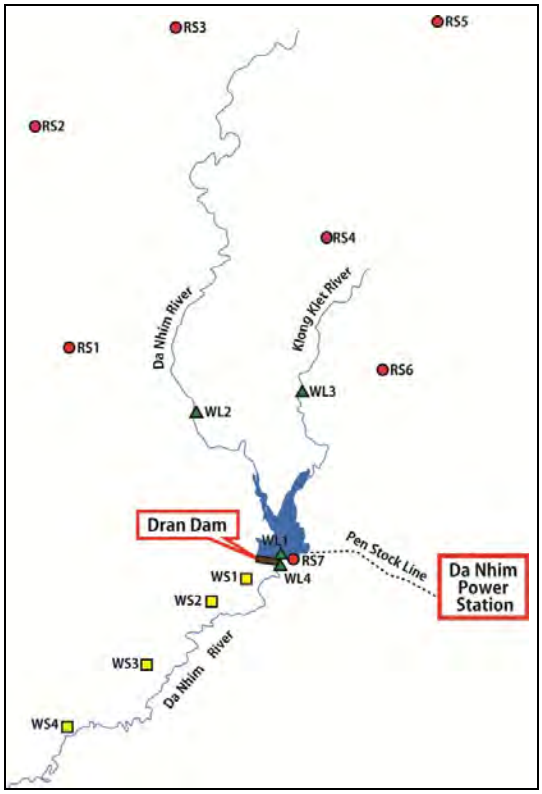


Figure 1: Map of Hydrological Data Acquisition System

(2) Warning System

The hydrological data acquisition system included the installation of a warning system. Warning stations (WS 1-4 on Figure 1) were installed along the Da Nhim River. At the warning stations, a siren blows before a water discharge. The warning system supplements a conventional warning system based on phone calls to local residents. The effective range of the siren is a radius of 2 km under fair weather conditions and a radius of 300-500m in rainy weather. WS covers the major residential areas along the Da Nhim River in the Don Duong district, Lam Dong province. Different types of siren are assigned to certain levels of water discharge. Interviews aith residents along the Da Nhim revealed that the siren could be heard 2-3 hours before water discharge[8].

[8] Interviewed with 5 residents (male 2 persons, female 3 persons) near the warning stations

Example use of the warning system - Flood in November 2010:

Heavy rain from October 30 to November 3, 2010 caused flooding in the downstream area of the Da Nhim River including in the Dong Duong district. In order to maintain the water level at the reservoir, DHD discharged water. DHD informed residents of water discharge by both telephone and siren.

DHD and the Dong Duong District Flood Control and Natural Disaster Mitigation Committee jointly carried out a damage assessment covering the area along the Da Nhim River in the Dong Duong district. This joint assessment found that the DHD operation followed proper discharge procedures and that residents were updated about the water discharge schedule in a timely way. An inundation affected vegetable crops in low areas including illegally cultivated land near the Da Nhim River[9]. No casualties were reported in the joint assessment by DHD and the committee.

Photo 2: Warning System

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

3.4 Impact

3.4.1 Intended Impacts

(1) Stable Supply of Electricity

The Da Nhim Hydropower station is considered an indispensable source of energy under the tight supply and demand conditions. In 2009, The Da Nhim power station accounted for 2.8% of power generation in the southern region. An interviewee at the Power Transmission Company No.4, which was engaged in power transmission in the southern part of Vietnam, mentioned that even a marginal supply, 1-2% of total generation, played a critical role in the stable supply of electricity.

Interviews with local residents in Ninh Tuang province where the Da Nhim power station is located confirmed that a lack of power supply had affected the ultimate customers[10]. According to residents, rotating blackouts had become more frequent for the last three years[11]. In particular, rotating blackouts occurred frequently in the dry season in 2010, although they had been rare in the rainy seasons. Residents have more electrical appliances and consumed more electricity than 10 years ago. Refrigerators and electrical fans, some of which were used for family-run small businesses, were popular products among the interviewees. The quality of life among the local residents depended more than before on a stable supply of electricity.

(2) Economic Development of the Southern Region

In Ninh Tuang province and Khan Hoa province, the Da Nhim hydropower is a major source of electricity. Both provinces also have experienced a population growth and economic expansion since the mid-1990s. The Gross Output of the industrial sector shows a boom in the manufacturing sector. Enterprises have started manufacturing operations along NH1 in Ninh Tuan province during the last decade and have partially contributed to this boom. As other factors also affect production in the manufacturing sector, growth is not only attributed to the implementation of this project. Nevertheless, it is can be said that the Da Nhim power station supports local manufacturers in stable operations through its supply of electricity.

[9] According to DHD, farmers often cultivate shoals and riverbeds where farming is prohibited.
[10] Interviewed with 9 residents including a commune leader (male 5 persons, female 4 persons)
[11] A planned blackout implemented by a power supplier in order to prevent a large-scale unplanned blackout

Table 6: Economic Statistics for Khan Hoa and Ninh Tuang

	Khan Hoa			Ninh Tuang		
	1996	2007	% change	1996	2007	% change
Population (1,000 persons)	979	1,147	17.2%	476	575	20.8%
GDP (1994 Price,VND bil)	2,931	9,047	208.6%	1,022	2,347	129.6%
Gross Output of Industry (1994 Price,VND bil)	1,895	9,269	389.2%	248	796	221.5%

Source: General Statistical Office (1998) "Socio –Economic Statistical Data of 61 Provinces and Cities in Vietnam", General Statistical Office (2009) "Socio –Economic Statistical Data of 63 Provinces and Cities in Vietnam"

3.4.2 Other Impacts

(1) Impacts on the Natural Environment

No significant negative impact on natural environment was observed during the site visit. As this project rehabilitated existing facilities, its impact on the natural environment was small. According to DHD, DHD complied with the relevant environmental regulations and monitored some of the parameters such as noise, vibration, discharged water and surface water in accordance with the regulations. DHD outsourced the treatment of waste such as waste oil to a company with the appropriate license.

(2) Land Acquisition and Resettlement

As the project scope was reduced to the rehabilitation of Da Nhim power station only, land acquisition and resettlement were not required. No significant negative impact on the social environment of neighbouring communities was observed.

It is plausible that this project has contributed to production activities in the region. Any negative impact on the natural and social environment is negligible.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

At the times of both the appraisal and the ex-post evaluation, EVN was a state-owned company, although the Vietnamese government no longer subsidized the operation of EVN at the time of the ex-post evaluation. The corporate splitting-up of EVN had progressed since the mid-1990s. There were several subsidiaries under EVN including DHD, the operator of the Da Nhim power station. At the time of the ex-post evaluation, EVN owned almost 100% of DHD's equity. Ownership on the part of external investors is very marginal, at less than 1%. The responsibility for O&M activities is clearly defined. While DHD is responsible for the operation and maintenance of the Da Nhim power station, EVN is responsible for the review and approval of maintenance and repair plans.

Table 7: Number of Staff at the Da Nhim power station

	2008	2009	2010
All staff	54	54	50
- Engineers	25	25	25

Source: DHD

The number of engineers has remained the same for the last three years. Staffing was not a critical issue for the O&M activities at the time of the ex-post evaluation.

3.5.2 Technical Aspects of Operation and Maintenance

According to DHD, the number and qualifications of the staff are sufficient for most facilities rehabilitated by this project. As mentioned in "3.3.1.1 (2) Planned and Unplanned Outages", DHD is able to cope with a malfunction of the control board by themselves. As water runners for turbines had trouble at the time of the ex-post evaluation, repair works were being planned. As for training, contractors held training classes when new equipment was installed. They were also able to reply to technical queries after completion and, if necessary, send personnel to the Da Nhim power station. DHD routinely assessed whether O&M staff had sufficient knowledge and maintained the technical capacity of staff by training. All O&M staff at the Da Nhim power station took following tests conducted by DHD every year:

(1) Annual knowledge test: basic knowledge relevant to operational positions. Staff failing this test must take a training course.
(2) Annual safety test: proper use of equipment for the prevention of accidents

3.5.3 Financial Aspects of Operation and Maintenance

O&M expenses increased during the last few years but stayed at 4-7 % of DHD revenue from power generation in 2007-2009. DHD power generation operation made a profit in the last three years (2007, 2008, and 2009) and O&M expenses are presumably at a bearable level for DHD. Wholesale price of electricity is currently set at the level which enables DHD to recovery generation costs and maintenance costs. On the other hand, a large-scale rehabilitation would require a financial support from the parent company EVN.

DHD obtains all debt financing via EVN. In addition, EVN owns almost 100% of DHD equity. EVN plays a vital role in the financial stability of DHD as DHD's financing activities depend mainly on EVN.

As shown in Table 8, the Debt to Equity ratio[12], which is above 2.0 at the time of the ex-post evaluation, shows the EVN high dependency on debt. However, the liquid ratio[13] is above 1.0 which shows that EVN is unlikely to face a liquidity problem in the foreseeable future. EBIT[14] surpasses net financial expenses, which suggests that EVN has enough earnings to cover interest payments. For these reasons, EVN is not expected to have problems with debt payment in the foreseeable future.

[12] Total Liabilities divided by Owner's Equity
[13] Current Assets divided by Current Liabilities
[14] Current Profit plus net interest payment

Table 8: Financial Data of EVN

Unit: million VND

	2007	2008	2009
Net Sales	58,105,693	64,715,085	79,955,153
Financial Income	1,378,720	2,031,528	1,521,225
Financial Expenses	3,477,119	5,572,631	5,136,479
Current Profit	3,354,359	1,076,604	2,803,506
EBIT	5,452,758	4,617,707	6,418,760
Net Income (after Tax)	3,335,853	1,496,443	3,116,141
Current Assets	49,813,704	50,170,544	61,935,158
Non-current assets	135,096,701	154,192,248	191,787,229
Total Asset	184,910,405	204,362,792	253,722,387
Current Liabilities	25,601,309	30,373,244	43,245,794
Non-current Liabilities	81,302,337	108,173,055	139,448,343
Total Liabilities	106,903,646	138,546,299	182,694,137
Net Worth	78,006,759	65,816,493	71,028,250
Owner's Equity	73,085,628	61,250,481	64,724,962
Liquid ratio	**1.95**	**1.65**	**1.43**
EBIT/Net Interest	**2.60**	**1.30**	**1.78**
D/E Ratio	**1.46**	**2.26**	**2.82**
ROE	**4.6%**	**2.4%**	**4.8%**
ROA	**1.8%**	**0.7%**	**1.2%**
Net Profit Margin	**5.7%**	**2.3%**	**3.9%**
Asset Turnover	**0.31**	**0.32**	**0.32**
Financial Leverage	**2.53**	**3.34**	**3.92**

Source: EVN Corporate Profile 2008/2009 and 2009/2010

Table 9: O&M budget for Da Nhim Hydropower Station

Unit: million VND

	2007	2008	2009	2010
O&M Budget	32,259	60,031	49,451	44,407
O&M Expenses	28,939	37,019	49,365	43,074

Source: DHD

3.5.4 Current Status of Operation and Maintenance

Several mechanical troubles have occurred since the completion of the rehabilitation works. Given the amount of Gross Electric Energy Production, it can be considered that they did not prevent the operation of the Da Nhim power station in the short run. However, there was a risk doing so in the long run.

(1) Water runners for turbines

Water runners for turbines experienced trouble twice after installation. The first incident was in 2006 and the second in 2010.

In 2006, a bucket in the water runner Unit 4 was broken and cracks were found in Unit 1. Since both Units 1 and 4 had enough design strength, it was concluded that inappropriate heat treatment in the post-welding process of their fabrication had caused this incident. Both units were replaced with newly-fabricated ones.

Similar incidents occurred again in 2010. Unit 3 was broken. Cracks were found in Units 1

and 4. At the time of the ex-post evaluation, Units 1 and 3 were shipped back to Japan for further inspection. The cause for the incident was considered material deterioration during the fabrication process. Based on this assessment, repair works were being planned. Units 1, 3 and 4 were replaced with old runners so that DHD could maintain normal operation.

(2) Rain fall stations and water level stations

At the time of the ex-post evaluation, all sensors at the rain fall and water level stations except WL 1 were taken away and stored during the dry season in 2011 in order to avoid theft. Underwater pressure sensors at the water level stations were often damaged by debris in the rivers. Before the flood season of 2011, sensors were to be replaced with ultrasound sensors which could be placed above river water.

(3) Others

After the completion of the rehabilitation work, bearings for power generators and seal rubbers in the pen stocks had defects. These were replaced with spare parts and this did not negatively affect the operation of the Da Nhim power station.

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

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project has been highly relevant to the development plan and development needs of Vietnam, as well as to Japan's ODA policy. The implementation of this project required more time than planned because of several reasons including a delay in the selection of consulting services and the careful preparation and examination of the detail design. Since the Gross Electricity Energy Production, a key performance indicator for a power station, fully met its target, the Da Nhim power station can be seen to have played a critical role under the conditions of tight supply and demand. Several mechanical troubles have occurred in the last few years but they had not prevented the operation of the Da Nhim power station at the time of the ex-post evaluation.

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

4.2 Recommendations

4.2.1 Recommendations for the Executing Agency

Repair works on water runners are being planned at the time of the ex-post evaluation. It will require a certain period of operation to conclude whether the repair works have been effective. It is recommended that EVN assess whether the contractor's countermeasures, including the warranty period after the repair works, are appropriate for the proper settlement of this engineering issue.

4.2.2 Recommendations for JICA

Mechanical troubles occurred for the water runners, though they did not negatively affect the smooth operation of the Da Nhim power station. As the cause of the incident was found, repair works were being planned. It will require a certain period of operation to conclude whether the repair works have been effective. It is recommended, as a precautionary measure, that JICA continue to monitor the plant operation after the repair works of the runners.

4.3 Lessons Learned

None

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1.Project Outputs	(1) Generator and ancillary facilities, substation facilities for the Da Nhim power station (2) Water turbine and ancillary facilities, waterway and ancillary facilities (3) Hydrological data acquisition system (6 rainfall gauging stations, 2 water level gauging stations, 2 repeater stations, 4 warning systems, data processing system, etc.) (4) Rehabilitation of Saigon Substation and 230 kV Transmission Line	(1)-(2) almost as planned with minor modifications (3) 7 rainfall gauging stations, 4 water level gauging stations, 1 repeater station, 4 warning systems, data processing system, etc (4) Canceled
2.Project Period	March 1997 – May 2001 (51 months)	March 1997 – August 2006 (98 months)
3.Project Cost		
Amount paid in Foreign currency	7,000 million yen	4,558 million yen
Amount paid in Local currency	1,239 million yen (123,900 million dong)	121 million yen (30,250 million dong)
Total	8,239 million yen	4,679 million yen
Japanese ODA loan portion	7,000 million yen	3,935 million yen
Exchange rate	1 dong = 0.01 yen (As of October 1996)	1 dong = 0.004 yen (As of January 2011)