

**EX-POST PROJECT EVALUATION 2010:
PACKAGE III-2 (VIETNAM, INDIA)**

NOVEMBER 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

GLOBAL LINK MANAGEMENT, INC.

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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.

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

Disclaimer

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

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Contents

Vietnam	“Bach Mai Hospital Project for Functional Enhancement”	
0.	Summary	1
1.	Project Description.....	1
1.1	Background	1
1.2	Project Outline.....	2
1.3	Outline of the Terminal Evaluation	3
2.	Outline of the Evaluation Study.....	4
2.1	External Evaluator.....	4
2.2	Duration of Evaluation Study.....	4
2.3	Constraints during the Evaluation Study	4
3.	Results of the Evaluation (Overall Rating: A)	4
3.1	Relevance (Rating: ③)	4
3.2	Effectiveness and Impact (Rating: ③).....	6
3.3	Efficiency (Rating: ②).....	22
3.4	Sustainability (Rating: ③)	23
4.	Conclusion, Lessons Learned and Recommendations	26
4.1	Conclusion	26
4.2	Recommendations.....	26
4.3	Lessons Learned.....	27
Vietnam	“The Project for Improvement of Facilities for the Hue Central Hospital”	
0.	Summary	1
1.	Project Description.....	1
1.1	Background	1
1.2	Project Outline.....	2
2.	Outline of the Evaluation Study.....	2
2.1	External Evaluator.....	2
2.2	Duration of Evaluation Study.....	2
2.3	Constraints during the Evaluation Study	3
3.	Results of the Evaluation (Overall Rating: A)	3
3.1	Relevance (Rating: ③)	3
3.2	Efficiency (Rating: ③).....	4
3.3	Effectiveness (Rating: ③).....	6

3.4	Impact	9
3.5	Sustainability (Rating: ②)	13
4.	Conclusion, Lessons Learned and Recommendations	16
4.1	Conclusion	16
4.2	Recommendations	16
4.3	Lessons Learned	16

Viet Nam “The Project for Construction of the Facilities for Measles Vaccine Production in Viet Nam”

0.	Summary	1
1.	Project Description	2
1.1	Background	2
1.2	Objective	3
2.	Outline of the Evaluation Study	4
2.1	External Evaluator	4
2.2	Duration of the Evaluation Study	4
2.3	Constraints during the Evaluation Study	4
3.	Results of the Evaluation (Overall Rating: A)	4
3.1	Relevance (Rating: ③)	4
3.2	Efficiency (Rating: ③)	8
3.3	Effectiveness (Rating: ②)	9
3.4	Impact	13
3.5	Sustainability (Rating:③)	16
4.	Conclusion, Recommendations and Lessons Learned	21
4.1	Conclusion	21
4.2	Recommendations	22

Viet Nam “The Project for the Groundwater Development in Rural Part of Northern Provinces in Viet Nam”

0.	Summary	1
1.	Project Description	1
1.1	Background	1
1.2	Objective	2
2.	Outline of the Evaluation Study	3
2.1	External Evaluator	3
2.2	Duration of the Evaluation Study	3

2.3	Constraints during the Evaluation Study	3
3.	Results of the Evaluation (Overall Rating: B)	4
3.1	Relevance (Rating: ③)	4
3.2	Efficiency (Rating: ③)	5
3.3	Effectiveness (Rating: ②)	6
3.4	Impact	15
3.5	Sustainability (Rating: ②)	18
4.	Conclusion, Lessons Learned and Recommendations	24
4.1	Conclusion	24
4.2	Recommendations	24
4.3	Lessons Learned	25

India “The Project for Construction of Diarrheal Research and Control Centre”

0.	Summary	1
1.	Project Description	1
1.1	Background	1
1.2	Project Outline	2
2.	Outline of the Evaluation Study	3
2.1	External Evaluator	3
2.2	Duration of the Evaluation Study	3
2.3	Constraints during the Evaluation Study	3
3.	Results of the Evaluation (Overall Rating: A)	4
3.1	Relevance (Rating: ③)	4
3.3	Effectiveness (Rating: ③)	7
3.4	Impact	9
3.5	Sustainability (Rating: ③)	17
4.	Conclusion, Lessons Learned, and Recommendation	19
4.1	Conclusion	19
4.2	Recommendations	19
4.3	Lessons Learned	19

Vietnam

Ex-Post Evaluation of Japanese Technical Cooperation Project
“Bach Mai Hospital Project for Functional Enhancement”

External Evaluator: Akiko Hirano, Global Link Management Inc.

0. Summary

This Project has been highly relevant with the Vietnam’s development plan and development needs, as well as Japan’s ODA policy both at the time of the Project planning and completion, therefore its relevance is high. This Project has realized the improvement of the Bach Mai Hospital (BMH) medical services by the enhancement of hospital management, clinical techniques and training capacity, the reduction of nosocomial infection, and the promotion of patient-centered treatment through the introduction of the Total Care activities. In addition, in terms of the medical services in the Northern Vietnam which were expected to be upgraded as the Project impact, it is observed that the medical services of provincial hospitals in the region were upgraded by synergetic effects of the Project and other related technical cooperation projects. Thus, its effectiveness and impact are largely high. On the other hand, some problems have been observed in terms of the Project design and its efficiency. No major problems have been found in the policy background and the structural, technical, and financial aspects of the executing agency, therefore, the sustainability of the Project effects is high. In light of the above, this Project is evaluated to be highly satisfactory.

1. Project Description



Project Location



Bach Mai Hospital

1.1 Background

While Vietnamese economy had been suffering from the impoverishment after 40 years of civil war, it strived to enhance social stability and economic growth by the introduction of the policy of Doi Moi (reconstruction) in 1986, which promotes the market economy. Several efforts had been also made in the health sector which brought the improvement of the health

situation compared to the neighboring countries, in such areas as life expectancy, infant mortality rate, immunization coverage, ratio of health expenditure against national budget and so on. On the other hand, many of the health care institutions faced deterioration of the facilities and buildings. Therefore strengthening of the health care network including the improvement of the base hospitals was one of the priorities of Vietnamese Government in the health sector.

BMH was established in 1911. Since then, BMH had been making significant contribution by providing medical services to the nation as a top referral hospital in the Northern Vietnam. At the same time, it also played an essential role as a major teaching hospital for the education of medical service providers for the Hanoi Medical University. However, BMH had been facing several issues such as the deteriorated facilities and equipment, lack of beds, lack of hospital staff's capacity, and lack of management skills, which hindered to serve its role effectively.

Under these circumstances, the Government of Japan implemented a Grant Aid project based on the request of the Government of Vietnam to improve the facilities of BMH in 1998. The Government of Vietnam also requested the technical cooperation to Japan in order to improve the quality of the BMH medical services.

1.2 Project Outline

Overall Goal		Medical services in the Northern Vietnam are upgraded
Project Objective		The quality of medical services is improved in Bach Mai Hospital (BMH) by focusing on Total Care ¹ activities
Outputs	1	General hospital management in BMH is improved by the end of 2004
	2	Hospital information system is improved in target departments
	3	Training system in target departments is improved
	4	Management of medical materials & equipment is improved by utilizing central system
	5	Financial and accounting management is improved
	6	Delivery system of medicine is improved in target departments
	7	Clinical activities are upgraded in target departments
	8	Nursing management and nursing care are improved
	9	Training function in collaboration with nursing school is improved
	10	Quality of examination is improved in clinical laboratories
	11	Provincial hospital supporting function of DOHA (Direction Office of Healthcare Activities) ² is improved

1 Total Care is a concept of "patient-centered treatment by the medical team" which has been notified by the MoH in 1996 in order to improve the medical service quality in Vietnam.

2 In Vietnam, the higher hospitals are obliged to conduct DOHA activities under the MoH direction, and provide training to the lower hospitals such as provincial hospitals.

Inputs	<p>Japanese Side:</p> <ol style="list-style-type: none"> 1. Experts 102 persons <ul style="list-style-type: none"> ● 10 for Long-Term, ● 92 for Short-Term 2. Trainees for Japan: 29 trainees 3. Trainees for Third-Country Training Programs: NA 4. Equipment: Approx. 310 million yen (2,835,791.24 USD) 5. Local Cost: Approx. 190 million yen (1,731,195 USD)*1 6. Others: 2 times of consultation <p>Vietnamese Side:</p> <ol style="list-style-type: none"> 1. 66 Counterparts *2 2. Land and Facilities: Project office, Utilities cost 3. Local Cost of counterpart salary and training costs
Total cost	Approx. 1,202 million yen
Period of Cooperation	January 2000 – January 2005
Implementing Agency	Ministry of Health (MoH), BMH
Cooperation Agency in Japan	International Medical Center of Japan (at the time of the Project implementation)
Related Projects	<p><u>Technical Cooperation</u></p> <p>“Bach Mai Project for Strengthening of Training Capacity for Provincial Hospitals (2006-2009)”</p> <p>“The Project for strengthening healthcare services provision in Hoa Binh Province (2004-2009)”</p> <p>“Project for Improvement of the Quality of Human Resources in Medical Services System (2010-2015)”</p> <p><u>Grant Aid</u></p> <p>“The Project for Improvement of Medical Equipment in Hanoi City (1994)”</p> <p>“The Project for Improvement of the Bach Mai Hospital (1998)”</p>

*1 and 2: Data of the Terminal Evaluation Report.

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement of Overall Goal

It was reported that while further study would be required to confirm it after the terminal evaluation, it could be assumed that the technical transfer toward the medical care providers in the region was in progress through the BMH DOHA activities. Other positive impact was also reported on the occasion of SARS (Severe Acute Respiratory Syndrome) outbreak in 2003 when the BMH made a contribution with JICA and other foreign assistance to contain the SARS without further outbreak.

1.3.2 Achievement of Project Objective

According to the survey on the Total Care activities at pilot departments, there was some improvement in the attitude of medical staffs such as all the nurses reported to have increased conversation with patients. The waiting time of outpatients was reported to be decreased based on the patient satisfactory survey, and the pilot clinical departments utilized the techniques transferred for the diagnosis and treatment. It was reported in the end that the BMH medical services had been improved though the degree was varying from one department to another.

1.3.3 Recommendations

- (1) In order to utilize BMH training center to diffuse techniques to provincial level;
 - 1) To work out Plan of Operation for the Project activities in the remaining period with cooperation of C/Ps and Japanese experts
 - 2) To continue developing standardized curricula and manuals/textbooks for utilizing introduced techniques through the Project
- (2) To hold final seminar to introduce “project outcome” to other provinces and organizations

The results of implementation of the recommendations were not available due to the change of main counterpart department in the BMH after the Project completion.

2. Outline of the Evaluation Study

2.1 External Evaluator

Akiko Hirano, Global Link Management Inc.

2.2 Duration of Evaluation Study

Duration of the Study: December, 2010 – November, 2011

Duration of the Field Study: March 27, 2011 – April 13, 2011, June 26, 2011 – July 10, 2011

2.3 Constraints during the Evaluation Study

Due to the unavailability of the Project annual reports and completion report, the change of the BMH main counterpart department and the transfer or retirement of some staff after the Project, the degree of the Project achievement at the time of its completion cannot be confirmed in some areas. Therefore, the achievement degree at the time of the completion is estimated complemented by the terminal evaluation report and the findings from the ex-post evaluation.

3. Results of the Evaluation (Overall Rating: A³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Relevance with the Development Plan of Vietnam

The national health strategy at the time of the Project planning was “The Strategic Direction on People Health Care and Protection 1996-2000”. The objective was to reduce morbidity, increase life expectancy and secure access to the quality and efficient medical services for every citizen, and one of the priority programs was the modernization of the medical care institutions. In addition, BMH Master Plan was approved by the MoH in 1995, which aimed to strengthen the function of the BMH based on the demands and needs of patients and the medical situation

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

4 ③: High, ② Fair, ① Low

in Vietnam.

The national health strategy at the time of the Project completion was “People's Health Care and Protection 2001 – 2010”. The overall objective was to secure access to primary health care services as well as access to and utilization of good quality health services for every citizen, and one of the priority programs was the development of medical technologies and information which emphasized to continue strengthening and improving the effectiveness of the high tech health centers including BMH.

3.1.2 Relevance with the Development Needs of Vietnam

According to the information from the MoH and some of the provincial hospitals at the time of the ex-post evaluation, BMH has been constantly providing the quality medical services to the people as a top referral hospital in the Northern Region. They also emphasized its vital role in improving the medical services of provincial and lower health care institutions in the region. Supporting the BMH could not only result in the improvement of the BMH alone, but also contribute to the upgrade of regional healthcare services in the North. Thus, the need of the development was regarded to be high.

3.1.3 Relevance with Japan's ODA Policy

Japan's first Country Assistance Strategy for Vietnam was formulated in 2000. The priority areas were “human resource and institutional building”, “infrastructure development including power, transportation and so on”, “agricultural and rural development”, “education, health and medical care”, and “environment”. The improvement of base hospitals was one of three pillars in the assistance strategy for the health and medical care sector. Ex Japan's Medium-Term Policy on ODA in 1999 was the assistance strategy prior to that. The “health care” was included in the “poverty reduction and social development” in the Policy and it was mentioned to continuously support core health care institutions in both tangible and intangible areas. Thus, the relevance with the Japan's assistance policy is high.

In 2008, Japan International Cooperation Agency (JICA) formulated the Cooperation Program on “Improvement of Health and Medical Services (2008 -2015)”. This program aims to achieve the improvement of the quality of healthcare services in Vietnam by specific goals of ① enhancement of capacity for policy making and implementation regarding personnel development, ② strengthening of provincial healthcare systems, and ③ improvement of facilities and equipment at central and provincial levels. This Project was part of the series of Japanese assistance for three core hospitals, namely Bach Mai Hospital in the North, Hue Central Hospital in the Central, and Cho Ray Hospital in the South, which was a basis for the

formulation of the Program.

3.1.4 Relevance of Project Design

The logic of the Project Design Matrix (PDM) and appropriateness of indicators are assessed. Overall, the Project composition seems to be logical in relation to the overall goal, project objective and outputs. However, the Project objective was very broad with a wide range of cooperation areas, and the focus on the specific objectives to be achieved came short within the limited periods and resources. Moreover, the quantitative targets of the Project objective and outputs indicators, and some of the specific techniques to be transferred were not set at the Project planning, therefore, the objective of each output was not clear.

This Project has been highly relevant with the Vietnam's development plan and development needs, as well as Japan's ODA policy, therefore its relevance is high. At the same time, the relevance of the Project design is regarded to be fair as while the overall Project composition is logical, the Project objectives are less clear and focused.

3.2 Effectiveness and Impact (Rating: ③)

3.2.1 Effectiveness

3.2.1.1 Project Outputs⁵

Project outputs are categorized into three groups, namely hospital management, clinical technique, and training capacity. In terms of hospital management, most of the assisted areas were improved except a few such as medicine delivery system. Clinical departments prioritized by the Project upgraded its techniques in diagnosis, treatment and training capacity. Training capacity toward the lower hospitals was improved while the standardization of curricula and materials was achieved only to some extent. Regarding the training capacity, the Project enhanced the DOHA activity which is a Vietnamese policy to oblige higher hospitals to train lower hospitals and it particularly contributed to the Project impact. In addition, the cooperation for the nursing care mainly contributed to the promotion of Total Care activities. Therefore, by and large, the outputs are regarded to be achieved. Detailed evaluation results are explained as follows.

(1) Output 1 : General hospital management in BMH is improved by the end of 2004

It is viewed that Output 1 is a content which should be assessed comprehensively by the

5 The indicators of the Project outputs were reset for the ex-post evaluation based on the indicators in the final PDM. However, as the targets of quantitative indicators were not set, it is judged that the expected results are achieved if the indicators show the trend of increase or improvement by the Project completion.

Output 2-6. Therefore, it is decided that the achievement of Output 1 alone is not to be assessed. Some of the key activities such as infection control under Output 1 will be assessed under other outputs and Project objective.

(2) Output 2: Hospital information system is improved in target departments

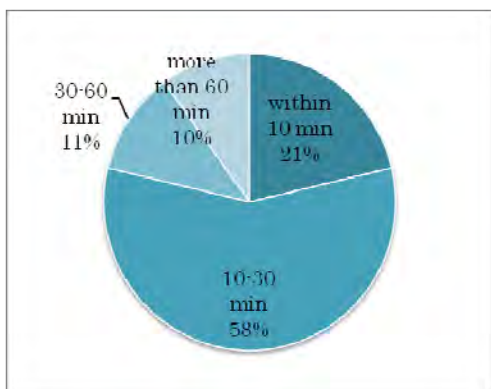
Set indicators are followings.

1	Number of department applied computer system
2	Establishment of patient database and outpatient medical record storage
3	Number of medical records stored by individual departments
4	Outpatient waiting time

By the time of the Project completion, several departments namely finance and accounting, human resource, pharmacy, emergency, medical equipment, biochemistry laboratory, etc had applied computer system in addition to the Project pilot departments. By the time of the ex-post evaluation, all of the departments have applied the computer system in the financial data management. The patient database was established for inpatient and outpatient separately by 2005. Outpatient medical record storage was established by 2005 and managed by the outpatient department (OPD). Inpatient medical record storage was managed by the general planning department. Thus, there were no medical records stored by individual departments.

In terms of outpatient waiting time, BMH officer explains that the procedure of diagnosis, treatment and payment became efficient through the introduction of computer system. The terminal evaluation report in 2004 mentioned that the waiting time was shortened from average 77 minutes in 2002 to average 49 minutes in 2004. The waiting time for the first check up of outpatients in gastroenterology and nephro-urology departments is shown in Figure 1, according to the beneficiary survey⁶ as a part of the ex-post evaluation. Around 80% answered to have received check up within 30 min. Thus, Output 2 is regarded to be achieved.

⁶ Beneficiary survey was conducted with the sample size of 40 patients each in the inpatient department of Gastroenterology and Surgery, and outpatient department of Gastroenterology and Nephro-urology in BMH. Total valid answers are 160.



Source: Beneficiary survey (N=80)



Figure 1 Outpatient waiting time for check up

OPD medical record storage

(3) Output 3: Training system in target departments is improved

Set indicators are followings.

1	Standardization of training curricula and materials for target departments
2	Development and implementation of training plan

Output 3 was newly set up after the mid-term evaluation as an area to be further strengthened. Pediatrics, emergency, gastroenterology and ICU (Intensive Care Unit) were selected as target departments. Training materials were reported to be standardized in pediatrics and emergency during the Project period, but not in the others. Terminal evaluation report mentioned that training curricula were not standardized by the Project assistance. Meanwhile, it is reported that the planning and implementation of training was conducted effectively in collaboration with DOHA department, currently training DOHA center, and individual clinical departments.

While it seems to have high achievement in the implementation of the training system with the contribution of Output 7 and 11, the major objective of Output 3 which is to standardize the training curricula and materials is achieved to only some extent.

(4) Output 4: Management of medical materials & equipment is improved by utilizing central system

Set indicators are followings.

1	Rate of operation
2	Number of medical equipment under regular maintenance
3	Number of medical equipment under central management system
4	Utilization status of major medical equipment

Results of indicator 1-3 are shown in Table 1. As all the data show the trend of

improvement by the Project completion, the Output 2 is regarded to be achieved. At the time of the ex-post evaluation, almost 100% of medical equipment, approx. 4,000 units, is under regular maintenance, and around 75% of them are under central management system.

Table 1 Operation status of medical equipment

Indicators	1999	2000	2001	2002	2003	2004	2005
Operation rate (%)	92	92	94	94.5	94.5	94	94
No. of regular maintained equipment	432	586	1,098	1,132	1,305	1,305	1,305
No of centrally managed equipment	NA	NA	142	176	206	246	246

Source: Terminal evaluation report (2004) and BMH

In terms of the utilization of major medical equipment provided by the Project, it is reported that the majority were utilized effectively during the Project period, while some of them already expired its service life time at the time of the ex-post evaluation as the average service life of medical equipment is 5 – 10 years in general. According to the interviews with the pediatrics, emergency and gastroenterology, most of the equipment is functioning well at the time of the ex-post evaluation as precious resources. It is also observed during the ex-post evaluation that major equipment at abovementioned departments is well managed and utilized.

(5) Output 5: Financial and accounting management is improved

Set indicators are followings.

1	Average annual income per bed
2	Amount of uncollected hospital fee

The results of above indicators are shown in Table 2. Both of them had been improved during the Project. Particularly the amount of uncollected hospital fee became zero in 2004 and 2005. However, it is reported that this was achieved due to the regulation change⁷ on the payment system. While the application of computer system and establishment of patient database shown in Output 2 are seen to have contributed to the improvement of overall financial and accounting system, the reduction of uncollected hospital fees which was an intended result of Output 5 was largely influenced by the external factor above. In addition, terminal evaluation report and interviews with the BMH show that the activities by the Project in this area were limited to staff training in the first year. Thus, the contribution of the Project in the Output 5 is regarded not to be high.

⁷ The current system is that inpatients are requested to put deposit more than actual fee, and outpatients are requested to pay all fees before services are provided.

Table 2 Average annual income per bed and uncollected hospital fee

Indicators	1999	2000	2001	2002	2003	2004	2005
Average income per bed (VND ⁸)	34,300	35,400	39,600	42,832	54,685	71,151	94,303
Uncollected hospital fee (1000 VND)	1,862,672	2,882,744	2,200,000	1,800,000	2,962,005	0	0

Source: Terminal evaluation report (2004) and BMH

(6) Output 6: Delivery system of medicine is improved in target departments

Set indicators are followings.

1	Amount of expired drugs
2	Number of development applied new system for drug delivery
3	Drug delivery time from pharmacist to patient

The data in 2004 and 2005 of indicator 1 and 2 were not available. It is reported that the amount of expired drugs are around 4-5 per year, and departments applied new drug delivery system are 100% for transfusion related drugs and 25% for solid drugs at the time of ex-post evaluation. No data are available for the time of drug delivery from pharmacist to patient.

Table 3 Number of expired drugs and departments applied new system

Indicators	1999	2000	2001	2002	2003	2004	2005
No. of expired drugs	NA	NA	NA	0	0	NA	NA
No. of departments with new system	NA	NA	NA	3	4	NA	NA

Source: Terminal evaluation report (2004) and BMH

By reviewing the indicators above, the achievement of this output is low or cannot be confirmed. According to the terminal evaluation report and interview in the BMH, it is regarded that the inputs of the Project in this area were very limited. Therefore, the achievement of the Output 6 and the contribution by the Project are low.

(7) Output 7: Clinical activities are upgraded in target departments⁹

Set indicators are followings.

8 VND : Vietnam currency. 1VND=0.0039 yen at the rate of April 2011

9 Target departments are categorized according to the priority level. Grade 1; gastroenterology, emergency, ICU, pediatrics, Grade 2: surgery, nephrology, pulmonology, Grade 3: infectious & tropical medicine, cardiology, neurology, endocrinology and diabetes. Total Care pilot: gastroenterology, endocrinology and diabetes. High priority is given to Grade 1 and total care pilot.

1	Mortality rate
2	Number of diagnosis and treatment procedures
3	Number of referral cases from other hospitals
4	Number of research papers

The departments with high priority by the Project, namely gastroenterology, emergency, ICU and pediatrics, are regarded to achieve the expected results. However, it is found that the set quantitative indicators alone are not enough to evaluate it in many cases due to the irrelevance to assess the quality of clinical technique¹⁰ or the lack of data. Therefore, the evaluation is complemented by the terminal evaluation report and interview with the BMH staff to identify the specific contents and techniques transferred by the Project and their utilization status.

Gastroenterology department reports that major inputs by the Project were on the utilization of the endoscopy including colonoscopy or endoscopic retrograde cholangiography (ERCP). In the emergency department, the major learning was the comprehensive trauma treatment. Various clinical handbooks developed by the Project have been updated regularly since then and utilized for the treatment. As a result, it is reported that the mortality rate had been reduced by the improvement of treatment techniques and equipment. In the pediatrics department, the Project was reported to have assisted in all aspects of diagnosis, treatment and training capacity. Clinical handbooks and training materials developed by the Project have been updated regularly and utilized effectively since then. It is reported that the mortality rate had been reduced mainly due to the improvement in the emergency and intensive care. ICU reports that though the total mortality rate was not changed much, the rate among the severe cases of multiple organ failure had been improved.

Table 4 Mortality rate (emergency, pediatrics, ICU) (unit: %)

Category	1999	2000	2001	2002	2003	2004	2005
Emergency	NA	NA	2.21	2.00	1.96	1.60	1.30
Pediatrics	0.75	1.07	0.93	0.60	0.57	0.33	0.40
ICU	9.10	8.67	12.80	7.60	7.90	9.09	8.95

Source: Mid-term evaluation report (2002) and BMH

¹⁰ It is said that many people in Vietnam prefer to die at home, so, serious patients tend to go home. Therefore, the mortality rate is regarded to be inappropriate to assess the clinical techniques. However, it is not necessarily applicable for all cases such as the emergency.



Handbooks & training materials in Pediatrics



Ultrasonography at Emergency

On the other hand, the contribution of the Project is limited or not confirmed in many of the clinical departments with lower priority, while lack of the information is observed in some departments. According to the terminal evaluation report, some of the planned activities were not implemented during the Project, which is regarded to be one of the factors for limited contribution.

(8) Output 8: Nursing management and nursing care are improved

Set indicators are followings.

1	Examination score
2	Development and utilization of nursing care manual.

There are no useful data available in the examination score. In terms of the nursing care manual, while it is reported that it has been developed and utilized properly with the Project contribution to some extent, BMH explains that the Project has mainly contributed to the promotion of the Total Care activities. The results in the Total Care activities are described in the “Achievement of Project Objectives” below.

(9) Output 9: Training function in collaboration with nursing school is improved

The data of the set indicator, which is the number of re-training courses for nurses, was not available. According to the BMH, the collaboration with nursing school was limited in the Project. Thus, the achievement is low.

(10) Output 10: Quality of examination is improved in clinical laboratories

Set indicators are followings.

1	Number of examination requested from outside
2	Total number of laboratory examination
3	Rate of re-examination
4	Result of quality control

Main support was given to the biochemistry laboratory and the data of above indicators in the biochemistry laboratory are shown in Table 5. Output 10 achieved the expected results as all indicators were improved during the Project implementation. According to the interview with the biochemistry laboratory, the Project provided the technical support mainly on the operation of the equipment and quality control of the examination. Particularly, the learning on the quality control was very useful acquiring its overall purpose and necessity, concrete approach, as well as training and teaching skills.

Table 5 Examination results in biochemistry laboratory

Indicators	1999	2000	2001	2002	2003	2004	2005
No. of examination requests from outside	840	1,440	3,240	3,700	5,200	7,236	8,948
Total no of laboratory examination	419,695	501,242	871,534	1,445,635	1,680,501	1,806,224	2,237,059
Re-examination rate (%)	5.0	4.0	1.1	0.6	0.6	0.5	0.5
Quality Control (%)	NA	NA	99.75	99.85	100	100	100

Source: Terminal evaluation report (2004) and BMH



Biochemistry laboratory



Bio urine analyzer

(11) Output 11: Provincial hospital supporting function of DOHA is improved

Set indicators are followings.

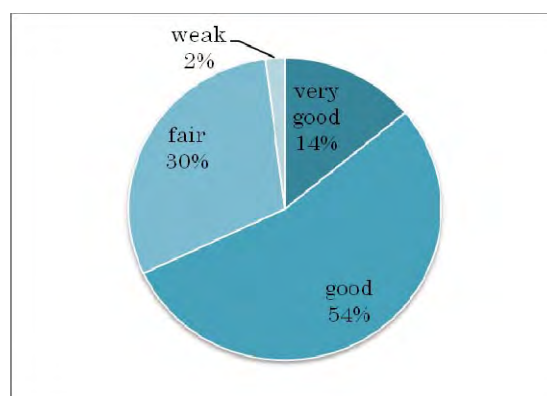
1	Number of training
2	Number of trainees
3	Satisfaction rate of training

The data in the indicator 1 and 2 are shown in Table 6. The training was conducted constantly by the Project completion. In terms of the satisfactory rate of training, the BMH survey¹¹ conducted for the trainees from 1999 to 2004 showed the high satisfactory rate with 48% of “very satisfied”, 49% of “satisfied”, and 3 % of “others”. According to the BMH survey¹² on the utilization of training contents in practice, as shown in Figure2, 68% answered they can utilize them at their work. One of the Project officers mentions that it was initially pointed out that the trained contents in the BMH could not be utilized due to the lack of facilities or equipment in the lower hospitals. However, it has been improved over the course to match the training content to the working environment of the trainees.

Table 6 Number of training and trainees

Indicators	1999	2000	2001	2002	2003	2004	2005
No of training: BMH cost	79	59	65	50	53	39	59
No. of training: Project cost	0	11	15	11	11	10	0
Total no. of training	79	70	80	61	64	49	59
No. of trainees	2,654	2,907	4,195	4,431	2,953	2,465	3,295

Source: Terminal evaluation report (2004) and BMH



Source: BMH

Figure 2 Utilization of training contents in practice

11 BMH conducted the survey with 22,136 trainees among those who were trained between 1999-2004.

12 BMH conducted the survey with 760 trainees among those who were trained between 1999-2004



Training center



Training at the training center

In addition, the training center was constructed by the Project fund in January 2005. The training center has been utilized properly since then. There are nearly 10 training rooms and around 60-100 trainings are conducted annually in the BMH. JICA related project which is “Bach Mai Project for Strengthening of Training Capacity for Provincial Hospitals (2006-2009)”¹³ is regarded to have made large contribution on this.

3.2.1.2 Achievement of Project Objectives¹⁴

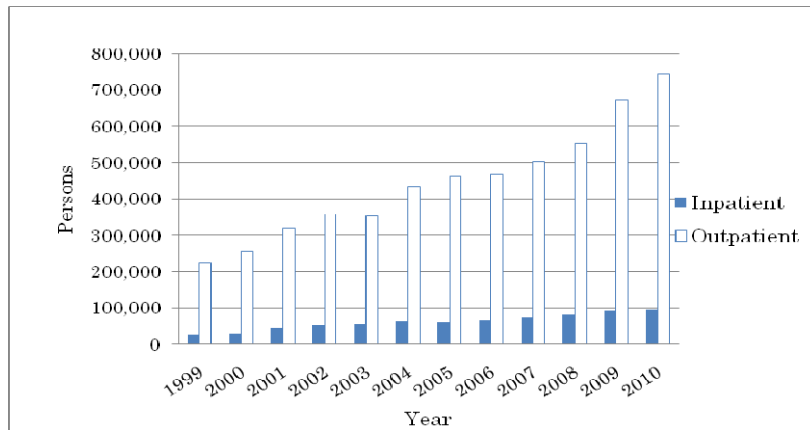
It is concluded that the Project has achieved its objectives. The details are shown below.

(1) Indicator 1: Number of patients

As shown in Figure 3, the number of patients has been increasing rapidly for both inpatients and outpatients during the Project and after that. As seen above, the hospital management and clinical techniques have been improved by the Project. Thus, the Project is regarded to have contributed to the increase of patients, though it is difficult to estimate the degree of its contribution.

¹³ “Bach Mai Project for Strengthening of Training Capacity for Provincial Hospitals (2006-2009)” was conducted in order to improve the BMH training capacity in four prioritized areas for the provincial hospitals staff.

¹⁴ As most of the indicators set for the Project Objective in the final PDM were duplicated with those for the Outputs, the indicators are reset at the time of the ex-post evaluation. It is judged, due to the lack of targets, that the expected results are achieved if the indicators show the trend of increase or improvement by the Project completion.

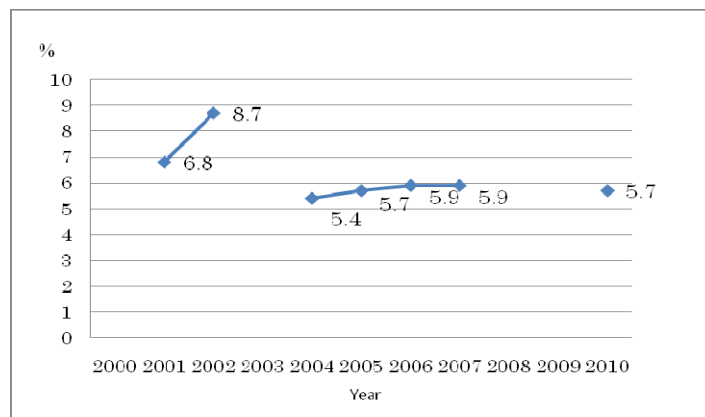


Source: BMH

Figure 3 Number of inpatients and outpatients

(2) Indicator 2: Nosocomial infection rate

Overall infection rate had been decreased by the Project completion as shown in Figure 4. However, it has not gone down since then. BMH staff in charge explains that though the BMH has been making efforts to further improve the situation, it is not easy to reduce it from this level. In terms of the individual rates for operation and ICU, both have been decreased while the data availability is limited to some of the years. The data have been shifted from 9.6% in 1999 to 4.3% in 2002 at the operation, and from 30% in 2003 to 21% in 2007 at ICU. Thus, it is regarded that the expected results are achieved.



Source: BMH

Figure 4 Nosocomial infection rate

(3) Indicator 3: Total Care activities

The Total Care was a new concept in Vietnam and the notion that the responsibility of patient care was confined to the nurses was prevailing in the BMH. Therefore, the Project initially conducted series of symposiums and dialogues to repeatedly share that the Total Care is the concept which should be dealt with by all medical care providers

cross-sectorally, as well as to discuss the purpose, the mission and the concrete activities of the Total Care. As a result, it is reported that the concept has been gradually understood within the hospital. By the Project completion, the Total Care was introduced in the departments of pulmonology, pediatrics, obstetrics, surgery, allergology, otorhinolaryngology in addition to the pilot two departments. It has been introduced in all the departments by the time of the ex-post evaluation.

It is difficult to assess the quantitative effects of the Total Care activities. However, according to the interviews with a few clinical departments, while earlier doctors and nurses tended to conduct tasks separately, they have been gradually working in a team to provide comprehensive care to the patients. In addition, it is reported that the quality and the efficiency of the medical services have been improved through the documentation of the treatment procedures or optimization of the working process with other departments such as pharmacy. It is mentioned by the some staff that the patients give them the positive feedback for their attitude.

According to the beneficiary survey at the ex-post evaluation, 99% of the outpatients answer that the doctors' attitude is good and 90% for the nurses. Patient satisfactory survey was conducted at the time of the terminal evaluation¹⁵. While the results of two surveys cannot be simply compared as their scope and target are different, the survey at the terminal evaluation showed that 85% answered good for the doctor's attitude and 80% for the nurses. In terms of the inpatients, the survey at the ex-post evaluation shows that 86% of the inpatients answer that the hospital staff's attitude is good and 92% answer that they are given enough information on the treatment and medication. The survey at the terminal evaluation showed that 74% answered good for the hospital staff's attitude and 76% answered given enough information on the diseases.

In this way, it is regarded that the Total Care activities have been enhanced and the expected outcome through its introduction has been realized in the BMH. On the other hand, the Total Care activities require much more time of the hospital staff than the conventional approach. It is reported by the BMH that there are some departments which find difficulties to provide adequate level of patient treatment as the staff is overloaded due to the increase of the patients. In addition, it is found that the hospital committee on the

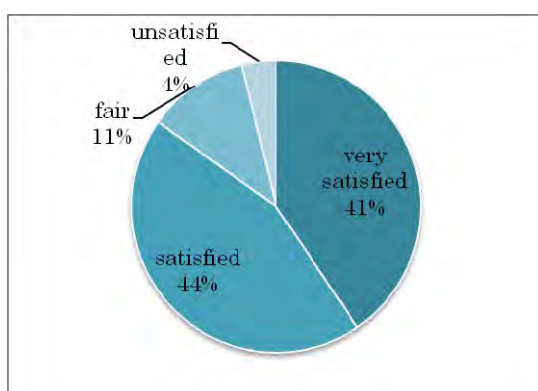
¹⁵ The patient satisfactory survey at the terminal evaluation was conducted with total 250 samples of in-patients (50 samples in each dept) at the 5 clinical departments such as gastroenterology and surgery, and 270 samples of out-patients at such clinical departments as gastroenterology, cardiology and nephro-urology.

Total Care, although established, has been limited in its activities and the guidelines and manuals have not been developed or updated promptly.

(4) Indicator 4: Patient satisfactory score

According to the terminal evaluation report, the patient satisfactory score was reduced from 74 in 2001 to 64 in 2004 during the Project implementation. It pointed out that the inadequate treatment for increased patients would be a possible reason for that. There is no data available at the time of the Project completion.

On the other hand, according to the beneficiary survey at the time of the ex-post evaluation, 85% of inpatients and 75% of outpatients were satisfied with the overall hospital services as shown in Figure 5 and 6. While it is difficult to compare the results with the score of the terminal evaluation as its definition is not clear, the score in the ex-post evaluation shows relatively high. At the same time, there are some comments such as the long waiting time for outpatients or the inadequate waiting space as reasons for dissatisfaction. Thus, while the achievement degree of this indicator at the time of the Project completion cannot be confirmed, it seems to have been improving after the Project.



Source: Beneficiary survey (N=80 each)

Figure 5 Inpatient satisfactory score

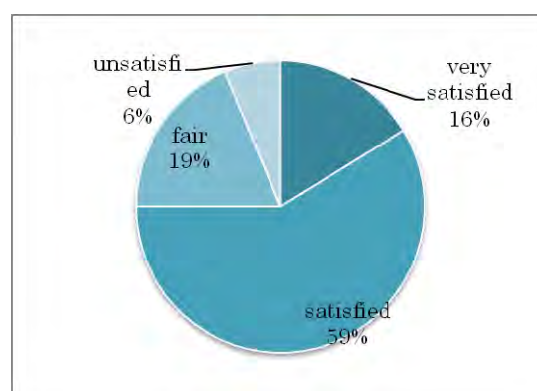


Figure 6 Outpatient satisfactory score

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal¹⁶

According to the questionnaire survey with four provincial hospitals¹⁷ conducted at the time

¹⁶ Indicators for Overall Goal were newly set at the ex-post evaluation as they weren't set in the final PDM.

¹⁷ The questionnaire survey was conducted with four provincial hospitals in (1) Hoa Binh (the counterpart agency of "The Project for strengthening healthcare services provision in Hoa Binh Province"), (2) Ninh Binh (one of four prioritized provincial hospitals supported by "Bach Mai Project for Strengthening of Training Capacity for Provincial Hospitals"), (3) Lai Chau, and (4) Tuyen Quang.

of the ex-post evaluation, it is confirmed that the BMH has been contributing to the improvement of medical service quality of each provincial hospital. One of the contributing factors for the improvement is regarded to be the fact that the BMH has conducted effective technical transfer to the lower levels utilizing the upgraded clinical technique and hospital management capacity through the Project. The details are explained as follows. In addition, the trend of the Project objective indicators illustrated above shows that the medical services of the BMH have been improving after the Project completion, and the BMH is found to be given the continuous trust from the provincial hospitals as a top referral hospital in the Northern Region. Therefore, it can be said that the overall goal to upgrade the medical services in the Northern Vietnam was by and large achieved.

(1) Indicator 1: Number of clinical techniques acquired by provincial hospitals from the BMH

While the useful quantitative data was not available on the number of clinical techniques, the provincial hospitals answer that they acquired the new techniques in such areas as emergency, pediatrics, total care, infection control, and medical equipment management through DOHA activities of training and dispatch of medical staff from the BMH.

(2) Indicator 2: Number of referral cases within the Northern Region

Provincial hospitals in Hoa Binh, Ninh Binh and Lai Chau inform that the number of referral cases to the higher level has been decreasing lately as they improved their clinical techniques mainly due to the technical transfer by the BMH.

Table 7 Referral cases from provincial hospitals to BMH

	2005	2006	2007	2008	2009	2010
Hoa Binh	NA	NA	1,346	1,403	1,380	883
Ninh Binh*1	4,053	6,632	6,176	4,173	9,445	3,932
Lai Chau	22	28	81	66	18	27
Tuyen Quang	NA	NA	NA	NA	NA	NA

Source: Each provincial hospital

*1: The figures include cases to other central hospitals than BMH.

On the other hand, it is reported that the referral cases from the district hospitals to the provincial hospitals have been increasing in Hoa Binh and Ninh Binh. While it could be thought that the improvement of medical services at the provincial hospitals is a contributing factor, it appears that the introduction and revision of the health insurance system would be more influential¹⁸ in this regard. Thus, it is not possible to assess the changes in the quality of

18 For the health insurance, usually people register with the district hospital. As the number of people applying for the insurance increases, the number of patients who first go to the district

the provincial hospital with these data.

(3) Indicator 3: Training conducted by provincial hospitals to the lower levels

All provincial hospitals have been conducting training for the lower levels whose number is overall on the rise. Some of provincial hospitals inform that the BMH has contributed to the enhancement of provincial hospital training capacity through BMH training in such areas as improvement of the quality of training curricula and the knowledge and skills of the trainers. It can be said that this effect was partly attributable to the technical support by the BMH via this Project and the following technical cooperation project “Bach Mai Project for Strengthening of Training Capacity for Provincial Hospitals (2006-2009)”, though the self-efforts of each provincial hospital to promote DOHA activities are considerable contributing factors.

Table 8 Number of training by provincial hospitals to the lower levels

Province	2005	2006	2007	2008	2009	2010
Hoa Binh	NA	NA	NA	94	156	34
Ninh Binh	12	12	16	16	24	50
Lai Chau	NA	7	12	20	41	59
Tuyen Quang	NA	NA	NA	NA	NA	27

Source: Each provincial hospital

For the capacity of the Hoa Binh and Ninh Binh provincial hospitals, there seemed to have been significant contribution by the JICA technical cooperation projects, namely “The Project for strengthening healthcare services provision in Hoa Binh Province (2004-2009)”¹⁹ and abovementioned following project for the BMH respectively.

3.2.2.2 Other Impacts

(1) Impacts on the natural environment

No impacts on the natural environment were recognized.

(2) Land Acquisition and Resettlement

No land acquisition and resettlement were conducted by the Project.

hospital and are referred to the provincial hospitals increases. On the other hand, initially the insurance could be utilized only at the registered hospital. However, since 2008, people can utilize the insurance at any hospitals with additional charges, thus the number of people who directly go to the higher level increases for the better services. In this way, the health insurance system is influential to the referral situation.

¹⁹ “The Project for strengthening healthcare services provision in Hoa Binh Province (2004-2009)” was a project to strengthen the provincial medical system in Hoa Binh including the provincial health department and district and lower level hospitals through the enhancement of DOHA and referral system.

(3) Other indirect impacts

1) SARS containment

According to the terminal evaluation report, BMH made a contribution in collaboration with the JICA and other foreign assistance by accepting SARS patients to containing SARS without further outbreak of the diseases.

2) Rapid increase of patients

It is reported that as the number of patients increased due to the improved hospital services, it turned out to bring negative influence on the service quality for the patient treatment. According to the interviews and beneficiary survey at the time of the ex-post evaluation, there are some complaints such as more than two inpatients sharing one bed in congested departments, or long waiting time. BMH recognized these issues and has been implementing various countermeasures to tackle them. Details are explained in the “Sustainability” later.



Corridor at the outpatient department

This project has largely achieved its objective which is “the quality of medical services is improved in BMH by focusing on Total Care activities”, and brought the expected effects in its overall goal which is “Medical services in the Northern Vietnam are upgraded”. Therefore, its effectiveness and impact are high. However, it is difficult to assess it quantitatively due to the lack of the quantitative target.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

Table 9 Plan and Actual of the Inputs

Inputs	Plan	Actual Performance
(1) Experts	<ul style="list-style-type: none"> ● 4 areas for Long-Term ● 17 areas for Short-Term 	<ul style="list-style-type: none"> ● 10 persons for Long-Term ● 92 persons for Short-Term
(2) Trainees received	Fields of training: NA	Fields of training: 29 persons in such areas as hospital management, nursing care, infection control etc
(3) Equipment	Approx. 137 million yen (equivalent to 1,127,800 USD) for medical equipment, examination equipment, and office items.	Approx. 310 million yen (equivalent to 2,835,791.24 USD) for medical equipment, examination equipment, and office items.
Total Project Cost	NA	Approx. 1,202 million yen
Total Local Cost	NA	Approx. 36.9 million yen (equivalent to 5,176 million VND) for training cost

3.3.1.1 Elements of Inputs

It is not possible to compare the plan and actual as the planned data for most of the inputs are not available. The Japanese experts for long and short term were dispatched according to the planned areas. In terms of the trainees received, most of the trainees received in Japan have been remaining in the BMH and in the position to be able to utilize the knowledge and skills learned from the training. Regarding the equipment, most of the provided medical equipment has been reported to be utilized properly. However, the actual cost for the equipment was more than double the planned. The detail is discussed in 3.3.1.2 project cost. While the planned cost shared by the Vietnamese side is not available, the training cost was provided from the first year and the amount had been increased over the course of the Project.

On the other hand, as shown in the “Effectiveness”, there were some outputs whose achievement rate was low since some of the activities were not implemented as planned and/or the contribution of the Project was limited. Some of the experts and counterparts involved in the Project mention that as the Project scope was diverging with the various areas and some of the cooperation areas were highly specialized, it would have been difficult for the Project management to grasp and manage all the plans and progresses thoroughly. Thus, it is regarded that the efficiency of the Project is low in some areas due to the dispersed cooperation areas vis-à-vis limited resources.

3.3.1.2 Project Cost

In terms of the Project cost, while it is not possible to compare the plan and actual due to the lack of planned cost, it exceeded the average of the general technical cooperation projects. For

the equipment cost, the actual cost was more than double the planned. The additional equipment seemed to be provided to various departments and almost half of them were office equipment such as personal computers. No clear reasons are confirmed to verify this increase.

3.3.1.3 Period of Cooperation

The Project period was five years from January 2000 to January 2005, which was as planned and relevant.

Although the period of cooperation was within the plan, elements of inputs were partially inappropriate and project cost exceeded the plan, therefore efficiency of the Project is fair.

3.4 Sustainability (Rating: ③)

3.4.1 Related Policy towards the Project

“Master Plan on development of Vietnam's healthcare system up to 2010 with a vision to 2020” follows the same direction as the previous one and promotes to improve the health facilities and health care services quality at all levels from central to commune. One of the objectives is to develop the networks of medical examination and treatment, and to concentrate investment in perfecting specialized health centers. In addition, “the comprehensive master plan of BMH to 2020” has been also approved by the MoH. The master plan aims to develop BMH to become one of the first-class specialized healthcare centers in Vietnam and a practical site for Northern medical education at all levels, and to have international standard. Thus, the national health policy at the time of the ex-post evaluation appears to continuously promote the BMH to play a vital role for the enhancement of the medical care services in the Northern Region.

3.4.2 Institutional and Operational Aspects of the Implementing Agency

The BMH carries the national highest technical rating²⁰ as a “special hospital”. The BMH is composed of one director, five vice-directors, 24 clinical departments, seven para-clinical departments, 10 administrative departments, several institutions and centers, and a few committees by major issues. The scale of the BMH has been expanding since the Project planning time and the number of beds is 1900 and the staff is 2200²¹ at the time of the ex-post evaluation.

Recently, the BMH started to acquire ISO (International Organization for Standardization)

20 The hospital is classified into “special hospital”, grade 1, 2, and 3 in descending order of technical capacity and the qualification is reviewed every five years.

21 200 out of total staff are on loan from the Hanoi Medical University.

9001. 15 units selected for the pilot departments have acquired ISO 9001 in 2010 and it is planned to scale up to the entire hospital gradually. Also, there are hospital committees for major issues such as infection control or total care formed with director/vice-directors and representatives from relevant departments to tackle the issues cross-sectionally. In terms of DOHA, DOHA department and training center were merged into the training DOHA center in 2009, which has been conducting training in collaboration with relevant clinical departments since then.

3.4.3 Technical Aspects of the Implementing Agency

The BMH has been conducting training for the lower levels on such areas as hospital management and clinical techniques. The trainees seemed to be satisfied with the training contents as shown in the “Effectiveness” and “Impact” above. For their own staff capacity, the BMH has been aiming to continuously strengthen it by providing opportunities for overseas training as well as the hospital internal training. In addition, it has been making efforts to advance the technical capacity in collaboration with the National Center for Global Health and Medicine in Japan, and various other international hospitals and universities in the US, Taiwan, Korea, Singapore, Belgium and so on.

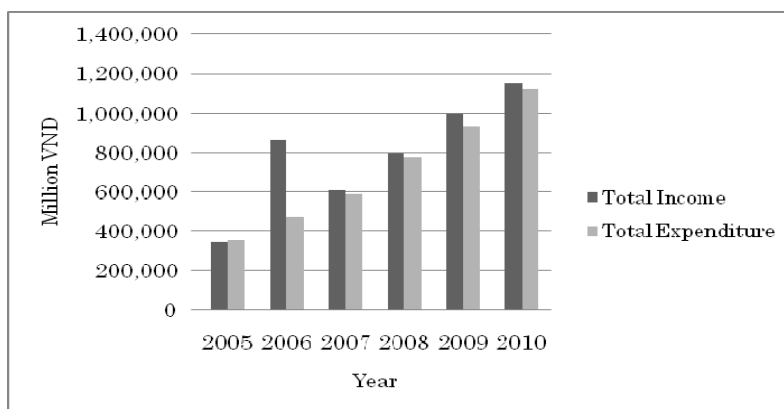
In terms of the management areas such as finance and medical record storage, all departments are reported to have applied IT system for their work efficiency. One of the issues to be tackled from now on is to unify the IT soft ware. The operation and maintenance of medical equipment is reported to be implemented appropriately without major problems by the hospital own staff in collaboration with the specialized agencies outside. At the same time, it is mentioned that the BMH plans to obtain specialized technicians for equipment management as there are some areas which require higher techniques. Thus, the sustainability of technical aspects appears to be high.

3.4.4 Financial Aspects of the Implementing Agency

The financial status of the BMH is shown in Figure 7. Total income has been on the rise and the balance of income and expenditure has been positive lately. Due to the Decree 43/2006/ND-CP²² which promotes the public hospital autonomous management, the MoH subsidies toward the BMH has been decreasing. However, the increase of medical fees and insurance income brings a rise in the total revenue. It is also reported that the necessary budget

22 Decree 43/2006/ND-CP “providing the mechanism of autonomy and self-responsibility for task performance, organizational apparatus, payroll and finance, applicable to public non-business units” was issued on April 25 2006 and includes the promotion of the self-responsibility in resource management for public hospitals.

is secured for the medical equipment maintenance. In this manner, the sustainability of financial aspects is regarded to be high.



Source: BMH

Figure 7 Trend of BMH income and expenditure

3.4.5 Continuity of Effectiveness / Impact

For the Project objective which is “the quality of medical services is improved in BMH by focusing on Total Care activities”, it is observed that the BMH has been providing quality medical services after the Project completion. Considering the hospital management structure, consecutive upgrade of the clinical techniques, and increase of the income and the number of patients, the BMH is likely to continuously provide quality services in the future. It is also probable to conduct training continuously and actively, as a leading training institution, for the lower medical facilities in the Northern Region²³. On the other hand, one of the challenges is the congestion in the hospital and overload for the hospital staff due to the increase of patients, leading to the inadequate conduct of the patient-centered treatment, which is the purpose of the total care, in some departments. To tackle this, the BMH has been making various countermeasures together with the MoH, including ① application to modern medicine in diagnosis and treatment to improve efficiency, ② strengthening medical care for outpatient to reduce the number of inpatients treatment, ③ strengthening health care services locally through DOHA activities, and ④ development and expansion of BMH treatment facilities.

No major problems have been observed in the policy background, and the structural, technical and financial aspects of the executing agency, therefore, sustainability of the project effects is high.

²³ BMH is conducting a satellite program since 2009 to provide technical support intensively for the eight selected provinces in the North with the Government financial assistance.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This Project has been highly relevant with the Vietnam's development plan and development needs, as well as Japan's ODA policy both at the time of the Project planning and completion, therefore its relevance is high. This Project has realized the improvement of the BMH medical services by the enhancement of hospital management, clinical techniques and training capacity, the reduction of nosocomial infection, and the promotion of patient-centered treatment through the introduction of the Total Care activities. In addition, in terms of the medical services in the Northern Vietnam which were expected to be upgraded as Project impact, it is observed that the medical services of provincial hospitals in the region were upgraded by synergetic effects of the Project and other related technical cooperation projects. Thus, its effectiveness and impact are largely high. On the other hand, some problems have been observed in terms of the project design and the efficiency. No major problems have been found in the policy background and, the structural, technical and financial aspects of the executing agency, therefore, the sustainability of the Project effects is high. In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Promotion of Total Care

It is found that while the Total Care activities have been enhanced in the BMH, there are some rooms to be improved. It is recommended for the BMH to promote and standardize the Total Care activities through developing hospital unified guidelines and manuals without any delay and activating the conduct of the Total Care committee. At the same time, it is expected for the BMH, considering to reduce overload of the hospital staff, to further strengthen the cross-sectional cooperation with all staff and departments to improve the work standardization and efficiency and to consider utilizing the services from outside, which would ensure the provision of quality medical services in spite of increased patients.

(2) Standardization of training materials

The training conducted for the lower levels in cooperation with the training DOHA center and relevant clinical departments is essential to upgrade medical services in the region. At the same time, it is found that there are some departments where each staff prepares the training materials individually when they conduct training courses. In order to enhance the quality of training, it is desirable to unify and standardize the training materials in all departments.

4.2.2 Recommendations to JICA

(1) Enhancement of cooperation with ongoing cooperation project

JICA cooperation in the health sector has been already working closely with the BMH as an essential partner. It is expected for JICA to further enhance the relations in the ongoing and planned cooperation in the Northern Region under the JICA Program on Improvement of Health and Medical Services in order to improve the quality and efficiency of the technical transfer from the BMH to the region, through sharing the project information beforehand among stakeholders and integrating inputs to existing activities such as DOHA.

4.3 Lessons Learned

(1) Relevance of the project plan

The Project was less focused on its specific objectives and scope. The cooperation areas were very wide and there were some areas where the achievement rate was low due to the lack of the inputs. In addition, as there were no quantitative targets set for the indicators, it seemed to have been difficult to implement adequate monitoring for all outputs, leading to the inadequate quantitative evaluation on the achievement rate. Hence, when planning the cooperation, it is necessary to first clarify the project objectives in relation to the cooperation program and overall goal, then narrow down the focus to the specific project scope and set the clear target for the project objectives and outputs.

(2) Improvement of the tertiary hospital and regional medical services (Good Practice)

It is found, as seen in “Impact”, that the inclusion of the component which was to strengthen BMH training capacity for the lower levels in the Project was effective to spread the benefits of the tertiary hospital improvement to the enhancement of the regional medical system. Hence, when planning the cooperation for the tertiary referral hospital in the future, it would be worthwhile to consider, for maximizing limited resources, including the aspect of technical transfer for the lower health facilities and/or improvement of the referral system in the region.

(END)

Vietnam

Ex-Post Evaluation of Japanese ODA Grant Aid Project
“The Project for Improvement of Facilities for the Hue Central Hospital”

External Evaluator: Akiko Hirano, Global Link Management Inc.

0. Summary

This Grant Aid Project (the Project) has been highly relevant with the Vietnam’s development plan, development needs, as well as Japan’s ODA policy, therefore its relevance is high. The efficiency of the Project is also high as both Project cost and Project period were within the plan and the outputs were achieved as planned. This Project has largely achieved its objectives by realizing such areas as the increase of number of operations, the reduction of average lengths of hospital stays and the increase of patients of the Hue Central Hospital (HCH). In addition, the positive impact has been identified in the improvement of medical services in the Central Region with the synergetic effects of the Project and the Japan International Cooperation Agency (JICA) related technical cooperation project. On the other hand, some problems have been observed in terms of financial aspects, therefore sustainability of the Project effect is fair. In light of the above, this Project is evaluated to be highly satisfactory.

1. Project Description



Project Location



Hue Central Hospital (HCH)

1.1 Background

Due to the severe impact by the war, the economic status in the Central Region was lower compared to the North and South Region, and the poverty rate was higher than the national average. The region was also prone to the natural disasters such as flood or hurricane and the transportation access was poor in the hilly areas, which brought the adversely influence on the public health status.

The Government of Vietnam had been conducting various measures to realize the universal

access of quality medical services to all nations and bring the reduction of morbidity, health promotion and increase of life expectancy.

HCH was one of the oldest hospitals in Vietnam which was established in 1894 and the only general hospital in the Central Region providing the tertiary medical services to the nation as a top referral hospital in the region. However, some of the hospital facilities were deteriorated and the hospital management was less efficient as the various buildings were disorderly located in the compound. Moreover, the planned beds were not enough to accommodate the increased number of patients and additional beds were placed in the wards or corridors. Under these circumstances, the Government of Vietnam requested to the Government of Japan the implementation of the hospital improvement plan with the construction of facilities and provision of medical equipment in order to enhance the hospital function.

1.2 Project Outline

The objective of the Project is to improve the quality of health care services in the Central Region by constructing hospital facilities and providing necessary equipment for the Hue Central Hospital as the base hospital in the Central Region.

Table 1 Project Outline

Grant Limit / Actual Grant Amount	2,989 million yen / 2,894 million yen
Exchange of Notes Date (/Grant Agreement Date)	Detailed Design : April, 2004, Construction: July, 2004
Implementing Agency	Ministry of Health, Hue Central Hospital
Project Completion Date	October, 2006
Main Contractors	Construction: Kumagai Gumi Co., Ltd Equipment: Ogawa Seiki Co., Ltd/Sojitz Corporation.
Main Consultant	Joint Venture of Nihon Sekkei Co., Ltd and Medical Engineering & Planning Co. Ltd.
Basic Design	June, 2003 to September, 2003
Detailed Design	May, 2004 to March, 2005
Related Projects	(1) Project for Improvement of Medical Services of Central Region (2005-2010) (2) Project for Improvement of the Quality of Human Resources in Medical Services System (2010-2015)

2. Outline of the Evaluation Study

2.1 External Evaluator

Akiko Hirano, Global Link Management Inc.

2.2 Duration of Evaluation Study

Duration of the Study: December, 2010 – November, 2011

Duration of the Field Study: 27th March, 2011 – 13th April 2011, 26th June 2011 – 10th July, 2011

2.3 Constraints during the Evaluation Study

No particular constraints were identified.

3. Results of the Evaluation (Overall Rating: A¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan of Vietnam

The national development strategy at the time of the Project planning was the “Vietnam’s Strategy for Socio-Economic Development in the Period 2001 – 2010”, which focused (1) to improve healthcare service quality at all levels, and (2) to upgrade equity and efficiency in access to and use of health care and protection services for the people. The national health strategy - “People’s Health Care and Protection 2001 – 2010” aimed to secure provision of primary health care services as well as access to and utilization of good quality health services for every citizen. One of its prioritized programs was the development of medical technologies and information which emphasized to continue strengthening and improving the effectiveness of the high tech health centers in major cities including Hue.

The national health strategy at the time of the ex-post evaluation, which is “Master Plan on development of Vietnam’s healthcare system up to 2010 with a vision to 2020”, follows the same direction as the previous one and promotes to improve the health facilities and health care services quality at all levels from the central to the commune. One of the objectives is to develop the networks of medical examination and treatment and functional rehabilitation, and to concentrate investment in perfecting specialized health centers in Hue and other major cities.

3.1.2 Relevance with the Development Needs of Vietnam

The Central Region which was a target area of the Project lagged behind in the economic and health status compared to other regions. As shown in Table 2, the poverty rate and infant mortality rate were worse than the national average. While the situation had been improved over the years, the latest data of 2008 showed that the figures have not yet reached to the national average. Thus, the needs to improve the health sector in the Central Region were high. The cooperation to the HCH could contribute not only to the improvement of the HCH capacity alone, but also to the development of medical care providers and improvement of medical service quality in the Central Region. Therefore, the relevance of the Project is high with the needs.

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

2 ③: High, ② Fair, ① Low

Table 2 Trend of economic and health statistics in Central Region and national average

	National average		North Central Coast		South Central Coast		Central Highlands	
	2002	2008	2002	2008	2002	2008	2002	2008
Poverty rate (%)*1	28.9	14.5	35.7 ^{*5}	18.4 ^{*5}	35.7 ^{*5}	18.4 ^{*5}	51.8	24.1
Percentage of commune health center with doctor *2	61.5	65.93	45.9	61.35	53.7	59.87	51.9	49.86
Infant mortality rate (/1000)*3	26	15	30.9	16	23.6	16	30.9	23
Under-five child malnutrition rate (%) *4	30.1	19.9	36	23.7	32.6	19.2	40.2	27.4

Source: *1 Statistical Yearbook of Vietnam 2009, General Statistics Office of Vietnam, *2 Health Statistics Yearbook 2002 & 2008, Ministry of Health, *3&4 Health Statistics Yearbook 2002 & Five-Year Health Sector Development Plan 2011-2015, Ministry of Health, *5 The data of North Central and South Central coast were merged for poverty rate.

3.1.3 Relevance with Japan's ODA Policy

At the time of the Project planning, the “Japan’s Country Assistance Program for Vietnam in 2000” was the Japan’s assistance policy. The priority areas were “human resource and institutional building”, “infrastructure development including power, transportation and so on”, “agricultural and rural development”, “education, health and medical care”, and “environment”. The improvement of base hospitals was one of three pillars in the assistance strategy for the health and medical care sector. Thus the relevance with the Japan’s assistance policy is high.

After the completion of the Project in 2008, JICA formulated the “Cooperation Program on Improvement of Health and Medical Services (2008 - 2015)”. This program aims to achieve (1) the improvement of the quality of healthcare services in Vietnam by specific goals of the enhancement of policy formulation and implementation, (2) strengthening of provincial health care systems, and (3) improvement of facilities and equipment at central and provincial levels. This Project was part of the series of Japanese assistance for three core hospitals, namely Bach Mai Hospital in the North, Hue Central Hospital in the Central, and Cho Ray Hospital in the South, which was a basis for the formulation of the Program.

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: ③)

3.2.1 Project Outputs

Project outputs from both Japanese and Vietnamese sides were achieved almost as planned. The details are shown in Table 3.

Table 3 Project Outputs (Plan/Actual)

	Plan	Actual
Japanese side	(1) Facilities ① Central Examination Unit (7 stories) - including Laboratory, Functional Examination, Operation Theater, ICU, Recovery Room etc ② Outpatient Department Building (3 stories) – including Emergency Department and Outpatient Clinic on Internal Medicine, Surgery Ophthalmology, ENT, Dental etc ③ Mechanical Building - including mechanical room, transformer room, generator room and necessary equipment	Completed almost as planned. Minor changes were made in the location of equipment and car parking, partition position, drainage system, water tank etc, but no changes in the Outputs.
	(2) Equipment ENT ³ treatment unit, X-ray unit, ambulance, operation unit, high pressure steam sterilizer, ultrasound scanner, dental unit, endoscopy, laboratory examination equipment etc	Completed as planned.
Vietnam side	(1) To secure a lot of land necessary for the construction of the project and to clear the site (2) To provide facilities for distribution of electricity water supply and drainage and other incidental facilities outside the site	Completed as planned.

Source: Basic Design Study Report (2003), HCH



Central Examination Unit (7 stories building) and Outpatient Department Building (3 stories building)



Endoscopy

3.2.2 Project Inputs

3.2.2.1 Project Cost

The Project E/N grant ceiling was 2,989 million yen and the actual expenditure from Japanese side was 2,894 million yen which was 97% of the ceiling amount. Thus the project cost was lower than planned. In terms of Vietnamese side, the planned amount was 41 million yen. While the detail expenditure for the implementation of the HCH planned Output was not available, the Ministry of Health (MoH) and HCH spent around 1.5 million USD, equivalent to

3 ENT is a short for Ear, Nose and Throat.

176 million yen, to build logistic building and purchase additional equipment in addition to the planned activities.

3.2.2.2 Project Period

The Project period was 30 months from May 2004 to October 2006, which was shorter than planned.

Both project cost and project period were within the plan, therefore the efficiency of the Project is high.

3.3 Effectiveness (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

The Project was expected to contribute to the improvement of the HCH through the enhancement of quality tertiary medical services, the centralization of examination and treatment units for efficient operation, and the improvement of medical services by increased hospital incomes. Two outcome indicators which are (1) number of operations and (2) bed occupation rate were set at the basic design study.

(1) Number of Operations

The trend of the number of operations at the HCH is shown in Table 4. The number of operation theaters (OT) at the time of the Project planning was 14 and the Project constructed 8 OTs including necessary equipment. After the Project, the number of operations has been increasing constantly and the target was met before 2010, though it was slightly later than planned.

Table 4 Number of Operations

Indicator	Baseline (2002)	Target (2007)	Actual (2007)	Actual (2008)	Actual (2009)	Actual (2010)
Number of operations	13,523	21,700	17,987	18,381	20,244	23,305

Source: Basic Design Study Report (2003), HCH

(2) Bed Occupation Rate (BOR) ⁴

The bed occupation rate and the number of planned and actual beds at the HCH are shown in Table 5. The baseline and target of BOR were calculated with planned number of beds, whereas the actual data after 2007 are the ones with actual number of beds based on the HCH practice. As the gap between the number of planned and actual beds is large,

⁴ An indicator to see the utilization rate of hospital beds.

it is not possible to assess the target achievement by comparing these data.

On the other hand, if using the actual number of beds, the baseline data in 2002 was 104%, and the figures after 2007 have been almost unchanged or slightly increased. According to the HCH, the Project was expected to reduce BOR by providing around 200 beds, out of which 50 was provided by the Japanese side and the rest was done by Vietnamese side, together with other facility improvement. However, it was not achieved due to the increase of patients which was caused by the improvement of hospital facilities, equipment and medical services. BOR tends to be influenced by several factors. Even if the number of beds is increased, BOR would not be reduced if the number of patients exceeds its pace. Therefore, it is regarded that while BOR has not been reduced, it does not necessarily mean that the Project has not made the improvement. Meanwhile, the national target of BOR is set between 90-100% by the MoH guideline which is “Hospital’s annual check guideline 2010”, and the HCH is planning to increase 600 beds in 2012-2013 to meet the target.

Table 5 Bed Occupation Rate and Number of Beds (plan/actual)

Indicator	Baseline (2002)	Target (2007)	Actual (2007)	Actual (2008)	Actual (2009)	Actual (2010)
Bed occupation rate: Planned no. of beds (%)	120.5	114	NA	NA	NA	NA
Bed occupation rate: Actual no. of beds (%)	104	NA	102.2	106.4	109.4	107.5
Planned no. of beds	1,090	1,100	1,100	1,400	1,400	1,400
Actual no. of beds	1,550	2,006	2,006	2,006	2,141	2,152

Source: Basic Design Study Report (2003), HCH

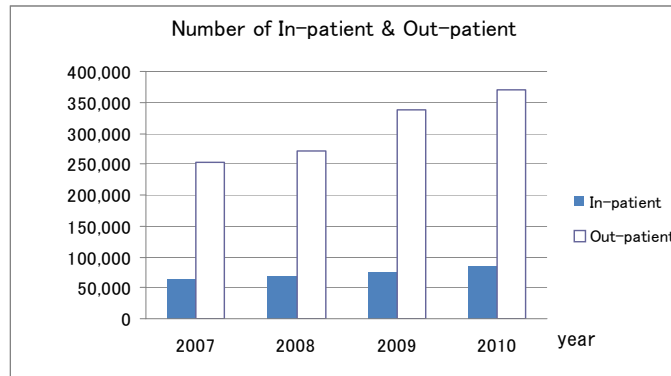
(3) Average lengths of hospital stay and number of patients

Average lengths of hospital stay and number of patients were mentioned in the basic design study report as indicators to be improved, though no baseline data and target were provided. The data of average lengths of hospital stay are shown in Table 6. It has been slightly reduced after the Project. It can be regarded that the Project has contributed to the improvement through efficient operation by the centralization of the examination and treatment units. In terms of the number of patients, both inpatient and outpatient have been increasing over the years as shown in Figure 1.

Table 6 Average lengths of hospital stay

Indicator	Actual (2007)	Actual (2008)	Actual (2009)	Actual (2010)
Average lengths of stay (days)	11.5	11.4	11.3	10.0

Source: HCH



Source: HCH

Figure 1 Number of patients

3.3.2 Qualitative Effects

(1) Patient waiting time

Although no quantitative data were available, the HCH explains that while the number of patients increased as a result of improvement of hospital facilities and equipment, and medical services, the waiting time of outpatients has been reduced. This was achieved by shortening the transit time through the centralization of major examination and treatment units, and improving the medical record management by HCH own efforts.

The survey results of patient waiting time based on the beneficiary survey⁵ as part of the ex-post evaluation are shown in Figure 2 and 3. In terms of the outpatient waiting time for the first contact by the medical care provider, around half was contacted within 10 minutes and 90% was within 30 minutes. It seems to be fairly short. In terms of the inpatient waiting time for the examination, 85% was treated within 30 minutes.



Source: beneficiary survey (N=60 each)

Figure 2 Outpatient waiting time for first contact

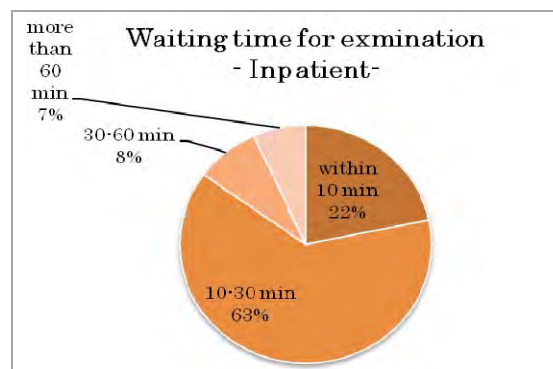


Figure 3 Inpatient waiting time for examination

⁵ Beneficiary survey was conducted with the sample size of 60 patients each in the inpatient department of Pediatric and Abdominal Emergency Surgery, and outpatient department of Internal Medicine in HCH. Total valid answers are 120.

(2) Utilization status of major facilities

It is observed that both the outpatient department building and examination unit are clean and well maintained.



Reception of Outpatient Department Building



Intensive Care Unit

(3) Utilization status of major equipment

Among the equipment provided by the Project, it is reported that major medical equipment have been effectively utilized, except a few which are under repair as waiting for the budget to purchase its spare parts. Details are explained in “3.5 Sustainability”.



Operation Theater



Dental unit

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

3.4 Impact

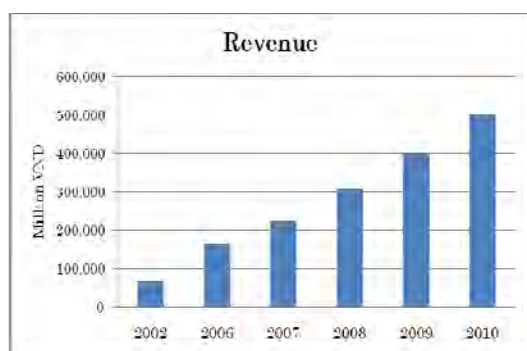
3.4.1 Intended Impacts

(1) Improvement of medical services through increased hospital incomes

The hospital revenue and financial balance of the HCH are shown in Figure 4 and 5. Both have been increasing over the years, and the revenue became almost threefold over

the past five years. Due to the Decree 43/2006/ND-CP⁶ which promotes the public hospital autonomous management, the MoH subsidies for the HCH have been decreasing. However, the increase of medical fees and insurance income brings a rise in the total revenue.

On the other hand, it is reported as one of the current concerns in Vietnam that due to the abovementioned Decree 43, there are some public hospitals who struggle to balance between securing the financial self-reliance and the quality of medical services. MoH takes a note on this issue and is reviewing the policy in relation to the hospital management including Decree 43 and considering introducing the new policy on the hospital management.



Source: Basic Design Study Report (2003), HCH

Figure 4 Total revenue

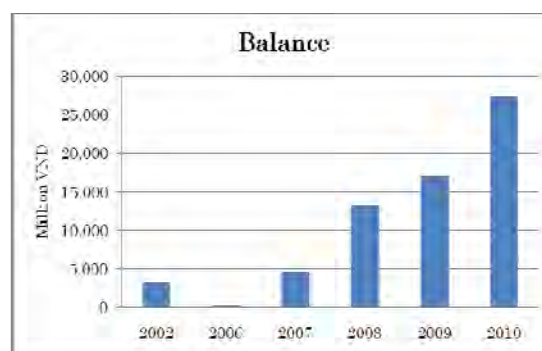


Figure 5 Financial balance

(2) Patient satisfactory score

The patient satisfactory scores in the beneficiary survey as the time of the ex-post evaluation are shown in Figure 6 and 7. 97% of both inpatients at the pediatric and abdominal emergency surgery department and outpatients at the internal medicine department answered “very satisfied” or “satisfied”. This is regarded fairly high. Some of positive comments include “the attitude of doctors and nurses is very good”, “the procedure of the examinations is very clear”, “the waiting time being reduced”, or “the facility and equipment are good”. At the same time, there are some negative comments such as the long waiting time or the lack of waiting space for family members.

6 Decree 43/2006/ND-CP “providing the mechanism of autonomy and self-responsibility for task performance, organizational apparatus, payroll and finance, applicable to public non-business units” was issued on April 25 2006 and includes the promotion of the self-responsibility in resource management for public hospitals.



Source: Beneficiary survey (N=60 each)

Figure 6 Satisfactory score of Inpatient

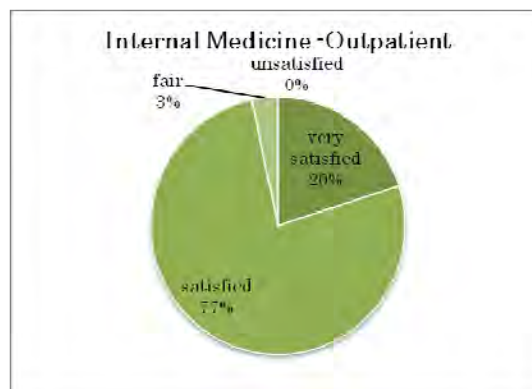


Figure 7 Satisfactory score of Outpatients

(3) Enhancement of medical services in the Central Region

According to the questionnaire survey with three Provincial Hospitals at the time of the ex-post evaluation, namely Ha Tinh, Phu Yen, and Quang Tri in the Central Region, they all answer that the HCH has been playing a vital role as a top referral hospital in the Central Region, and its medical service quality has been improving over the last five years.

Provincial hospitals also state collectively that the HCH has contributed to the improvement of their medical services. It is mentioned that the various techniques on the clinical procedures or maintenance of medical equipment have been transferred to the provincial hospitals through the training and the medical care providers dispatched from the HCH. Quang Tri provincial hospital explains that due to the improvement of medical services in such areas as emergency treatment or endoscopy technique, there are now more cases which can be treated by the provincial hospital. Thus the number of referral cases to the HCH is declining.

Table 7 Number of referral cases from Quang Tri provincial hospital to HCH

	2007	2008	2009	2010
No. of referral cases	913	946	960	749

Source: Quang Tri provincial hospital

The Project was followed by the JICA technical cooperation of “Project for Improvement of Medical Services of Central Region (2005-2010)”, whose objective was to expand and improve training activities of the HCH for the provincial hospitals in the Central Region. It is regarded that the abovementioned improvement of provincial hospitals has been realized by the synergetic effects of the Project and this technical

cooperation project. In Vietnam, there is a policy, named DOHA⁷, which obliges higher hospitals to train medical care providers at the lower hospitals. The abovementioned technical cooperation was implemented in line with this policy.

3.4.2 Other Impacts

(1) Impacts on the natural environment

No impacts on the natural environment were recognized in such areas as drainage, medical waste, exhaust, noise or vibration.

(2) Land Acquisition and Resettlement

No land acquisition and resettlement were conducted as the Project was implemented within the original hospital compound.

(3) Increase of patients from other regions

While almost 90% of the patients come from three vicinity provinces, it is reported that the patients from other areas have been increasing recently. The HCH mentions that more patients even from the South and the North of Vietnam are coming to the HCH these days for better medical services.

(4) Expansion of the HCH

The HCH explains that the improvement of central examination unit and outpatient department building, and major medical equipment through this Project became a trigger for further expansion of the HCH and a number of assistance have been offered from the Government of Vietnam and development partners since then. Since 2008, various facilities namely cardiovascular center, training center, center for ophthalmology, blood transfusion center, international hospital, and oncology center have been constructed or under preparation by the assistance of World Bank, Atlantic Philanthropies, Austrian agencies and so on.

⁷ DOHA: Direction Office of Healthcare Activities. In Vietnam, the higher hospitals are obliged to conduct DOHA activities, under the MoH direction, and provide training to the lower hospitals such as provincial hospitals.



Hue Central Hospital Master Plan Model by 2014

As shown above, in addition to the expected positive impact, the Project has contributed to the increase of beneficiaries even outside the target area as well as the expansion of the HCH facilities. It is regarded that these effects are realized by the synergetic efforts of the Project and the JICA related technical cooperation project. Negative impact was not confirmed.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

The administration department is in charge of the operation and maintenance (O&M) for the hospital facilities. The department contains 20 technicians, and outsources some of the O&M work. They hired the additional maintenance staff, as recommended during the basic design study, for the newly constructed air conditioning system of the operation theaters. O&M work is conducted according to the annual, monthly and weekly maintenance plans.

In terms of the medical equipment, the material and equipment department is in charge of the O&M. The department consists of 47 staff and they are divided into seven task groups. The equipment database was developed in 2006 with the assistance of the development partner in Luxemburg. With the support of the abovementioned “Project for Improvement of Medical Services of Central Region”, all the information such as specification, maintenance and repair record and so on, is managed collectively in the database. Regular maintenance work is conducted according to the annual plan for all the medical equipment. At the same time, the medical equipment is in the possession of the individual departments at the moment, therefore the central management system in which the authority of the allocation and management of the equipment is given to one department has not yet been established.

3.5.2 Technical Aspects of Operation and Maintenance

The O&M for the facilities and medical equipment has been conducted appropriately and

there are no big problems observed in terms of the O&M technical aspects. For the medical equipment, while the maintenance of the high-tech equipment such as CT scan or ultrasound examination machine is outsourced to the specialized agency, the rest of the equipment has been maintained by the hospital staff properly. The material and equipment department developed and published the textbook on medical equipment management, 81 operation procedures and 9 maintenance procedures for medical equipment, and has been conducting training for internal staff as well as provincial hospitals. As shown in Table 8, the training has been conducted constantly for the last a few years.

Table 8 Training on the O&M of medical equipment

	2007	2008	2009	2010
No. of training	8	12	3	10
No. of trained staff	253	426	60	307

Source: HCH

3.5.3 Financial Aspects of Operation and Maintenance

The trend of O&M cost is shown in Table 9. In terms of the facilities, it is reported by the hospital staff that it is around 3 to 4 billion VND required annually which has been more or less secured.

Table 9 O&M cost for facilities and medical equipment (Unit: million VND)

	2003 (estimate)	2006	2007	2008	2009	2010	2011 (budget)
O&M cost for facilities	550	2,420	4,256	2,768	3,700	4,462	2,500
O&M cost for medical equipment	1,429	635	1,122	1,188	1,076	756	2,500

Source: Basic Design Study Report (2003), HCH

On the other hand, the O&M cost for medical equipment has been reduced over the last few years and is well below the amount estimated⁸ in the basic design study in 2003⁹. Officer in charge of the material and equipment department explains that not enough budget is provided for the O&M. In fact, a few equipments are found to be out of order due to the lack of the budget

8 Basic design study report in 2003 stated that the O&M for facilities and equipment including utility cost at the time of planning was 5,311 million VND. It was estimated that 3,372 million VND for the facilities and 3,285 million VND for the equipment would be required after the completion of the Project which was almost double the amount prior to the Project.

9 Basic design report in 2003 stated that the HCH and the MoH confirmed to secure the necessary O&M budget. Also, while the JICA technical cooperation "Project for Improvement of Medical Services of Central Region" provided support in the medical equipment management, the issue of securing O&M budget was treated as an external assumption and it did not seem to be recognized as an essential issue, according to the terminal evaluation report.

for spare parts at the time of the ex-post evaluation. The HCH mentions that the material and equipment department compiles the request on the maintenance cost for equipment from all the departments and set the priorities for budget allocation. It is explained that the high priority for the budget allocation is usually given to the personnel cost and it is difficult to accommodate all the requests for the equipment maintenance since the request is too large.

While the HCH claims that the countermeasure is to increase the hospital fee by renewing the MoH hospital price list, it seems to be difficult to happen¹⁰. At the same time, the HCH is making its best efforts to improve the situation, and in fact, the budget for the year 2011 is increased to be around 2,500 million VND for the equipment O&M out of 5,000 million VND for the total O&M.

Material and equipment department is making own efforts to make up for the budget deficiency by conducting regular check up more frequently and thoroughly to prevent breakdowns in the first place. The staff at the material and equipment department are placed high trust by the clinical departments on their activities.

3.5.4 Current Status of Operation and Maintenance

Facilities and equipment are more or less maintained well except the financial issue mentioned above. Some of the minor problems identified at the time of the ex-post evaluation are shown in Table 10.

Table 10 Problem and countermeasure in facility and equipment

	Problem	Countermeasure
Facility	Moldy dirt is found on the ceiling board around AC diffuser in the emergency recovery room.	Due to the humidity, the same place becomes dirty and moldy frequently. It is treated by painting or panel replacement from time to time.
Equipment	General X ray unit at radiology, and broncho fiberscope and blood gas analyzer at laboratory are waiting for the budget to purchase spare parts.	They have low priority as there are some other machines of the same kind functioning.

Some problems have been observed in terms of financial aspects, therefore sustainability of the Project effect is fair.

¹⁰ Hospital price list has been enacted in 1995 and has not been revised since then. Therefore, there are many voices requesting the revision of the list. Under these circumstances, the MoH has been trying to increase the hospital fee, however, there is little prospect of realizing it due to the strong resistance from the community people.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This Project has been highly relevant with the Vietnam's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high. The efficiency of the Project is also high as both Project cost and Project period were within the plan and the outputs were achieved as planned. This Project has largely achieved its objectives by realizing such areas as the increase of number of operations, the reduction of average lengths of hospital stays and the increase of patients of the HCH. In addition, the positive impact has been identified in the improvement of medical services in the Central Region with the synergetic effects of the Project and the JICA related technical cooperation project. On the other hand, some problems have been observed in terms of financial aspects, therefore sustainability of the project effect is fair. In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Securing the maintenance cost for medical equipment

It is recognized that the maintenance cost for medical equipment has been inadequate. Therefore, it is recommended that the material and equipment department and hospital management side hold close dialogue to build common recognition on the importance of the maintenance cost and to secure the adequate cost from now on.

4.2.2 Recommendations to JICA

(1) Enhancement of cooperation with ongoing technical cooperation project

While it is planned to work together with the HCH in the JICA ongoing "Project for Improvement of the Quality of Human Resources in Medical Services System" as a major partner for training implementation, it is recommended that the closer collaboration to further strengthen the HCH capacity. In addition, as the abovementioned project is reported to plan the regular conference with the directors of three core hospitals, namely Bach Mai hospital, HCH and Cho Rai hospital, the MoH, and the project team, it is desirable that, if appropriate, it provides a platform to discuss and share the key issues such as hospital management or financial issues including the ones out of the abovementioned project scope.

4.3 Lessons Learned

(1) Maintenance cost security

In this Project, although it was confirmed to secure the maintenance cost for facilities and equipment by the HCH and MoH at the time of the planning, in fact not enough budget

was provided for equipment. Thus, when conducting the same type of cooperation in the future, it is desirable to address it, not only at the project planning stage, but also during the project implementation and/or after the project completion. Particularly, when there are the grant aid follow up project or technical cooperation for the same counterpart agencies implemented, it is ideal to share the suggestions or countermeasures during its implementation.

(2) Synergetic effects of Grant Aid and Technical Cooperation (Good Practice)

After the Project, the JICA technical cooperation of “Project for Improvement of Medical Services of Central Region” was implemented in order to improve the HCH training capacity for the provincial hospitals in the Central Region. As a result, due to the synergetic effects of two projects, the result of the improvement of the tertiary referral hospital by the grant aid project has been contributed to the enhancement of provincial level health services through the technical cooperation. Hence, when planning the cooperation for the tertiary referral hospital in the future, it would be worthwhile to consider implementing the related projects which include the aspects of technical transfer for the lower health facilities and/or improvement of the referral system in the region.

(END)

Viet Nam

Ex-post Evaluation of Japanese Grant Aid Project

“The Project for Construction of the Facilities for Measles Vaccine Production in Viet Nam”

External Evaluator: Junko Miura, Global Link Management

0. Summary

This project has been highly relevant with the Viet Nam’s development plan and Japan’s ODA policy. Regarding development needs, there is a gap between the amount of measles vaccines which was regularly required at the time of planning and that of the time of ex-post evaluation. However, considering comprehensively that the number of cases of measles is still the highest among the six major infectious diseases of children at the time of ex-post evaluation, that outbreaks occur every few years, that the urgency of the project for providing stable supply of domestic measles vaccines is high and that the decrease in the required amount is due to the external factor which was not expected at the time of planning, it can be said that its relevance is high. Both project cost and project period were mostly as planned, therefore efficiency of the project is high.

This project established the physical and technical production capacity of 7.5 million doses per year of measles vaccines, which meet the World Health Organization (WHO) - Good Manufacturing Practice (GMP)¹, and achieved its objective to provide stable supply of the vaccines. Synergy effect with other projects has also been observed. On the other hand, the annual production quantity of measles vaccines at the time of ex-post evaluation is approximately 3.3 million doses, which is equivalent to 44% of its target at the time of planning or to 67% of its demand (required amount for regular vaccination) at the time of ex-post evaluation. The reason why the production amount remains 67% of its demand is that imported vaccines have been used for the second dose of regular vaccination, and this is an external factor for the executing agency. However, the government could have decreased imported vaccines for regular vaccination and could have increased the purchase amount of measles vaccines manufactured by POLYVAC as a counter-measure for 2010 and beyond. Although it was confirmed that it is possible that the annual production amount increases in the future, the effectiveness of the project at present is fair. Since it is only after 2011 when it is possible to measure the contribution of this Project to the achievement of the impact indicators, it is difficult to evaluate it at present. However, the indicators of the

1 GMP provides basic ideas about the good manufacturing practice and does not describe the detailed actions and methods. Each vaccine manufacturer needs to interpret the idea, to formulate its implementation plan and to carry it out. At the GMP assessment which is conducted every two years, there are Q&A sessions between the staff in a facility and inspectors regarding the interpretation of GMP, and the staff needs to explain logically and to provide evidence in order to persuade inspectors. Furthermore, because GMP assessment is conducted based on the latest knowledge in the world at that point, it is not easy to keep matching with the GMP.

expected positive indirect effects such as the ratio of two-dose vaccination of measles almost achieved those targets. No major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high. In light of the above, this Project is evaluated to be highly satisfactory.

1. Project Description



Project Location



Measles Vaccines and Water for Injection produced by POLYVAC

1.1 Background

The Government of the Social Republic of Vietnam (hereinafter called “Vietnam”) had been implementing the Expanded Program on Immunization (EPI) as one of the national programs since 1981 in order to provide an effective means of reducing the infant mortality rate and under five mortality rate and suppressing infectious diseases. At the time of planning, this Program was aimed at a higher EPI immunization rate and the efforts to establish the self-supply system of EPI vaccines (for polio, measles, diphtheria, whooping cough, tetanus and tuberculosis) had been made, enabling the domestic production of EPI vaccines except the measles vaccines. The vaccination rate in Vietnam was keeping 93% or more for the primary vaccination since 1993. However, the Primary Vaccine Failure (PVF)² and the Secondary Vaccine Failure (SVF)³ had increased, resulting in the increase of patients after 1997. 19,000 cases of measles occurred in 2000, and the outbreak had occurred every 7 to 8 years. This fact showed the limit of the primary vaccination effect. Under this circumstance, the Government of Vietnam (GoVN) started to introduce the regular vaccination in two times gradually as recommended by WHO. Therefore, it was predicted that the domestic demand for measles vaccines would increase. On the contrary, it was also predicted that vaccines manufacturers in developed countries would shift from the production of measles vaccines at low costs to the high-profit vaccine production. Hence, it was concerned in Vietnam, which depended on importing measles vaccines, about

2 Primary Vaccine Failure: No immunization is obtained because the vaccine effect is reduced by the insufficiency of the low temperature storage system.

3 Secondary Vaccine Failure: If the measles infection is reduced, the immunization effect of measles vaccination cannot be sustained, causing the contraction of measles more than 10 years after vaccination.

whether measles vaccines could be imported in a stable quantity at a low price.

Under these circumstances, the GoVN requested the Government of Japan (GoJ) for this Project, the Measles Vaccine Production Facilities Construction Project. In 2003, the GoJ decided to implement the project of constructing the measles vaccine production facilities under the grant aid as a part of the former Poliomyelitis Vaccine Research and Production Center (current Center for Research and Production of Vaccines and Biologicals: POLYVAC)⁴, which had produced vaccines under the direct control of the Ministry of Health in Viet Nam. Immediately after the completion of this Project, the Technical Cooperation Project for Strengthening Capacity for Measles Vaccine Production (2006-2010) was implemented.

1.2 Objective

The objective of this project is to provide stable supply of measles vaccines which matches the WHO - Good Manufacturing Practice (GMP) standard in Hanoi City by constructing the vaccines production facilities and the quality control facility, by providing the procurement of the equipment required for the vaccine production and by implementing technical guidance. The project summary is shown in Table 1.

Table 1 - Project Summary

Grant Limit/ Actual Grant Amount	2,277 million yen / 2,271 million yen
Date of Exchange of Notes	Detail Design: February 2003, Bidding and Civil Work: June 2003
Implementing Agency	Center for Research and Production of Vaccines and Biologicals (POLYVAC)
Project Completion Date	March, 2006
Main Contractors	Construction: Obayashi Corporation, Equipment: Mitsubishi Corporation and Ogawa Seiki Corporation
Main Consultant	Joint Venture: Nihon Sekkei, Inc. and JGC Corporation (Nikki)
Basic Design	“The Project for Construction of the Facilities for Measles Vaccine Production in Viet Nam”, March 2002- September 2002
Detailed Design	May 2003-October 2003
Related Projects	“Technical Cooperation Project for Strengthening Capacity for Measles Vaccine Production in the Socialist Republic of Viet Nam”, March 2006-March 2010 ⁵ . Follow-up cooperation for technical transfer (April 2010- March 2011). Follow-up study (August 2010- November 2010). Follow-up cooperation for facility and equipment (January 2011-August 2011).

4 Former POLIOVAC: Poliomyelitis Vaccine Research and Production Center. POLIOVAC was renamed as the Center for Research and Production of Vaccines and Biologicals (POLYVAC).

5 The Project Purpose is “POLYVAC will be capable to produce necessary amount of measles vaccines for use of measles control activities in the Socialist Republic of Viet Nam complying with the Viet Nam GMP (VN-GMP) which has met WHO-GMP standard”. The Overall Goal is “Measles Infection Rate in the Socialist Republic of Viet Nam will be decreased from the current level”. Outputs are the followings: 1) Staff of POLYVAC acquires appropriate technical skill to produce quality measles vaccines, 2) Production and quality management meet Vietnam-GMP which has met WHO-GMP standard.

2. Outline of the Evaluation Study

2.1 External Evaluator

Junko Miura, Global Link Management Inc.

2.2 Duration of the Evaluation Study

Duration of the Study: From December, 2010 to November, 2011.

Duration of the Field Study: From April 3rd to 17th and From July 4th to 15th, 2011.

2.3 Constraints during the Evaluation Study

The use of the measles vaccines produced by POLYVAC started only after POLYVAC obtained sales license in November 2009. Thus, it is difficult to evaluate to what extent this Project has contributed to the indicators of the indirect effects such as the target population of the two-dose vaccination and the ratio of two-dose vaccination at present.

3. Results of the Evaluation (Overall Rating: A⁶)

3.1 Relevance (Rating: ③⁷)

3.1.1 Relevance with the Development Policy of Viet Nam

At the time of planning, the long-term policy for health and medicines for 2001-2010 highlighted the importance of public medical policy and preventive medicines and targeted the vaccination of measles vaccines for all the children concurrently and the introduction of two-dose regular vaccination by 2008 and the eradication of measles by 2010. The policy was also aiming for enhancing the procurement ratio of domestic measles vaccines to the extent possible.

At the time of ex-post evaluation, the guidance for the objectives and direction for the Expanded Program on Immunization (EPI) (2006-2010)⁸ outlined the following targets regarding measles: 1) to reduce the measles prevalence rate to less than one per hundred thousand persons by 2010; and 2) to implement immunization campaigns in addition to regular vaccination in order to keep the two-dose vaccination rate for one-year-old and two-year-old children at 95% or more. Furthermore, the Five-Year Plan for the Health Sector for 2011-2015 is aiming to produce EPI vaccines including measles vaccines domestically and to meet the GMP standards. The objective of producing EPI vaccines domestically was also declared by the Vice Minister of the Government of Viet Nam at the conference “Investment in the

6 A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, and D: Unsatisfactory.

7 ③: High, ②: Fair, and ①: Low.

8 The guidance for the objectives and direction for the EPI (2011-2015) is currently under preparation. Hence, the guidance for 2006-2010 is the latest one.

pharmaceutical field towards 2020” in September 2010⁹.

3.1.2 Relevance with Development Needs of Viet Nam

At the time of planning, in Viet Nam, among the six major infectious diseases of children (polio, measles, diphtheria, whooping cough, tetanus and tuberculosis)¹⁰, both number of infected cases and the mortality in measles were the highest. In 2000, 19,000 cases of measles were reported annually, and this showed the limit of the primary vaccination effect. Under this circumstance, the GoVN started to introduce two-dose regular vaccination gradually since 2000. Whereas it was expected that the domestic demand for measles vaccines would increase in Viet Nam, vaccine manufacturers in developed countries started to shift from the production of measles vaccines at comparatively reasonable costs to the high-profit vaccine production. Therefore, there was an urgent need for stable supply of measles vaccines at a low price in Viet Nam, which depended on importing measles vaccines.

At the time of ex-post evaluation, among the six major infectious diseases of children, the number of cases of measles was the highest as follows: measles 5,358; tuberculosis 408¹¹. The disease, of which the number of cases is the highest among the above six diseases between 2005 and 2009, was also measles. In addition, the number of suspected cases of measles in 2009 was approximately 23,056 cases¹², and outbreaks still occur. Considering the fact that the delay in the import process of measles vaccines affects the two-dose vaccination rate, the needs for stable supply of domestic measles vaccines still remain high.

In Viet Nam, the number of cases of rubella has been increasing. Therefore, pursuant to the recommendation by WHO, the Ministry of Health (MoH) is currently considering in introducing Measles Rubella (MR) vaccines for the second dose particularly for the fifteen to thirty five year-old women after 2013 and for the 18 month children after 2016. In order to respond to the shift in the development needs, POLYVAC is currently preparing the application for the JICA Technical Cooperation Phase II (tentative) in order to acquire the skills in MR vaccine production. As the government’s policy is to replace one of two doses of measles vaccines with MR vaccines, the needs for measles vaccines still remain high.

Meanwhile, there is a gap between the amount of measles vaccines which was regularly

9 Source: Document of the government of Viet Nam (245/TT-VPCP).

10 Source: Health Statistical Yearbook, 2000.

11 Source: Health Statistical Yearbook, 2010. Data is that of 2009.

12 Source: Measles and Rubella cases confirmed by laboratory and others, Viet Nam, 2003-2011, WHO, 2011.

required at the time of planning and that of the time of ex-post evaluation. The following two can be raised as the reasons why the demand of measles vaccines at the time of ex-post evaluation was less than the estimated amount. First, as shown in the target group in Table 2, the target group at the time of planning included not only the under-one children and under-five children in the whole country including the mountainous high-risk area but also the total of 1.2 million children of 1-2 year old and 6-10 year old in the high-risk area. However, due to the synergy effect between the establishment of the cold-chain and measles eradication campaign after 2002, vaccination for the children of 1-2 year old and 6-10 year old in the high-risk area became unnecessary by the time of ex-post evaluation. Second, as shown in the number of target group in Table 2, the target population in the whole country at the time of ex-post evaluation is smaller than that of the planning by 0.6 million. Although the data on the number of births before 2002 could not be obtained, the average annual number of births from 2003 and 2008 was approximately 1,494,000¹³, and this shows that the target population at present is smaller than its estimate of planning¹⁴.

Considering that outbreaks occurred in 2005 and 2009, the government changed its policy to provide eighteen-month-old children with the second dose of the vaccines after 2011 in order to raise the vaccination rate of children between one and five year old particularly. If there is no major change with the future population, it is expected that there is no major change with the target population for vaccination in the coming years.

13 Data Source: WHO Bulletin 2011, Original data: UNICEF.

14 Birth rate is also declining between the planning and the ex-post evaluation. Birth rate was 18.62 in 1999, 17.91 between 1999 and 2004, 17.75 between 2004 and 2009, 16.59 between 2009 and 2014 (projection). "Health in Asia and the Pacific", WHO.

Table 2 - Target population for regular vaccination and the amount of measles vaccines required for regular vaccination

	Plan (2002)	Mid-term evaluation of the Technical Cooperation (2007)	Ex-post evaluation (2011)
Target age	Under one year old infant: 1.8 million persons, Under five year old children: 1.8 million persons, Children in high risk zones in mountainous areas (1-2 year old: 0.6 million persons, 6-10 year old: 0.6 million persons)	First dose: 9 month old infants x 1.6 million Second dose: under six year old children ¹⁵ x 2.5 million	First dose: 9 month old infants x 1.5 million Second dose: 18 month old children x 1.5 million
Target population	Total: 4.8 million persons/year	Total: 4.1 million persons/year	Total: 3 million persons/year
Required amount of vaccines (Note 1)	4.8 million/year x wastage factor figure 1.5 (Note) = 7.2 million/year + contingency 0.3 million/year = 7.5 million/year	4.1 million/year x wastage factor figure 1.5 = 6.15 million/year	3 million/year x wastage factor figure 1.5 = 4.5 million/year + contingency 0.4 million/year = 4.9 million/year

Source: Ex-ante evaluation summary sheet (2002), Mid-term Evaluation of the “Technical Cooperation Project for Strengthening Capacity for Measles Vaccine Production in the Social Republic of Viet Nam”(2007) and data from the National Institute of Hygiene and Epidemiology (NIHE), 2011.

Note : Wastage Factor Figure= 100/(100-Wastage Rate). Wastage rate is about 33%, the yield rate is 67%. The above wastage factor rate was calculated based on the condition that ten doses are contained in one vial and that vaccines are formulated in freeze-dry. For example, if only one person is vaccinated in six hours after a vial is opened, the rest of nine doses in the vial are disposed.

3.1.3 Relevance with Japan’s ODA policy

At the time of planning, priority areas of the Japan’s ODA policy towards Viet Nam (ODA Country-wise Databook, 2002) were human resource & institutional development, upgrade of economic infrastructure such as electricity and transportation, development of agriculture and rural areas, education, health and medical system, and environment. As this Project was included in the health and medical system, the project was consistent with the Japan’s ODA policy.

In light of the above, This project has been highly relevant with the Viet Nam’s development plan and Japan’s ODA policy. Regarding development needs, there is a gap between the amount of measles vaccines which was regularly required at the time of planning and that of the time of ex-post evaluation. However, considering comprehensively that the number of cases of measles is still the highest among the six major infectious diseases of children at the time of ex-post

¹⁵ At the time of planning, the target group for the 2nd dose was five year old children. In the guidance for the objectives and direction for the EPI (2011-2015), it was under-six children (before entering school). These are considered the same meaning substantially.

evaluation, that outbreaks occur every few years, that the urgency of the project for providing stable supply of domestic measles vaccines is high and that the decrease in the required amount is due to the external factor which was not expected at the time of planning, it can be said that its relevance is high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

The outputs were completed almost as planned. The output of the project is shown in Table 3.

Table 3 - Output (planned and actual)

Items	Planned	Actual
Japanese Side	<Facility> - Construction of Vaccine Production Building and Animal Test Building - Electrical works of Mechanical Building <Equipment> Water supply unit, vial washing machine, filling machine, autoclave, laminar flow unit, incubator, dry oven, freezer, etc. <Soft component> Technical guidance regarding the three steps out of six steps of validation (Design Qualification: DQ, Installation Qualification: IQ and Operation Qualification: OQ) ¹⁶ , preparation of GMP related documents, and the technical guidance for operation and maintenance.	As planned.
Vietnamese Side	<Facility> - Administration Building, Parking Garage, Canteen, Security Guard House - Architectural and structural works of Mechanical Building - Wells, incinerator, site works, etc. <Equipment> Furniture, lockers, shelves, etc.	As planned. except incinerator. Incinerator was removed from the list because it was not approved due to the regulation of Hanoi City.

Source: Basic Design Report (2002) and Questionnaire Answer.



Front of the MVPF Building



Signboard of the building installed in 2006



Filling and labeling room

¹⁶ Regarding Performance Qualification (PQ), Media Fill Test (MFT) and Process Validation (PV), technical guidance was provided by the Technical Cooperation Project.

3.2.2 Input

3.2.2.1 Project cost

The Exchange of Note (E/N) ceiling amount of this project was 2,277 million yen, and the estimated cost by the GoVN was 230 million yen. However, the actual cost for the Japanese side was 2,271 million yen (99.7% of the plan), and the actual local cost was equivalent to 547 million yen¹⁷. Therefore, the Japanese Grant component was within the plan whereas the GoVN component was increased compared to its planned cost. It was because the estimate did not include the cost for seeds, expense for test production, operation and maintenance cost and because the market price was escalated. Thus, the increase of the cost can be justified.

3.2.2.2 Project period

The planned project period was 35 months from May 2003 to March 2006¹⁸. The project period was as planned.

Both project cost and project period were mostly as planned, therefore efficiency of the project is high.

3.3 Effectiveness (Rating: ②)

3.3.1 Quantitative effects

(1) Annual Production Quantity of Measles Vaccines

Table 4 shows the annual production quantity of measles vaccines at the facility constructed by this Project.

Table 4 - Annual Production Quantity of Measles Vaccines

(unit: million doses per year)

Indicators	Target for the 1 st year and 2 nd year	Target for the 3 rd year and beyond	Actual for the 1 st year (2009)	Actual for the 2 nd Year (2010)	Actual for the 3 rd Year (2011)
Vaccines manufactured from imported bulk	0.5	0	Approximately 0.3	0	0
Vaccines manufactured from seed virus	0	7.5	Approximately 2.37	Approximately 2.39	Approximately 3.3
Annual Production Amount of Measles Vaccines (Note 1)	0.5	7.5	Approximately 2.67	2.39 Note 2	3.3

Source: Targets are from the Ex-ante Evaluation Summary. The actual figures and prospect for 2011 are from POLYVAC production management record.

Note 1: Because it is necessary for POLYVAC to produce more than ordered, the annual production amount of the measles vaccines is more than the amount purchased by MoH.

Note 2: This figure does not include 0.3 million, which was abandoned because its quality was not guaranteed due to the frequent black-out in the production process.

¹⁷ 78,196,648,000VND. Calculated based on the average exchange rate between May 2003 and March 2006: 1VND=0.0070.

¹⁸ The installation of the small items such as lockers was completed in June 2006.

By the year of 2009, the first year after the commencement, the production capacity of 7.5 million doses per year was obtained. Meanwhile, as shown Table 4, the actual annual production quantity in 2011 remains as low as 3.3 million doses per year against the target for the third year of 7.5 million doses per year (approximately 44% of its target). 3.3 million doses per year is equivalent to 67% of the required amount for regular vaccination (4.9 million doses per year). The reason why the production amount remains 67% of its demand is that the Global Alliance for Vaccination and Immunization (GAVI) started in 2007 providing the MoH with the budget for purchasing measles vaccines for the second dose of regular vaccination and for campaigns and as a result that imported vaccines has been used for them. Because GAVI's supply of imported vaccines is a tentative action until the year of 2012, it is highly possible that the amount of the order from the MoH to POLYVAC will increase after 2013 and that the annual production quantity will increase up to 4.9 million doses per year accordingly.

Other possibilities which affect the annual production amount are as follows.

- 1) As noted in the section of relevance, after 2013, if the government of Viet Nam adopts a policy of replacing the second dose of measles vaccines with MR vaccines, there is a possibility that the annual production amount will decrease by half. On the other hand, if an environment enables POLYVAC to produce MR vaccines, the total production amount of measles vaccines and MR vaccines will be maintained at the same level of the current status.
- 2) As described below, if the National Regulatory Authority (NRA) acquires accreditation and POLYVAC obtains prequalification from WHO, it becomes possible to use the vaccines of POLYVAC for campaign¹⁹ and to export, which makes it possible to utilize the production capacity more than now.

Because only the vaccines which obtained prequalification from WHO is allowed for vaccination with the assistance by international organizations, the government of Viet Nam cannot purchase the vaccines manufactured by POLYVAC, which has not obtained prequalification from WHO yet. In addition, it is an essential requirement that the NRA obtains accreditation from WHO before POLYVAC applies to WHO for prequalification. The approval and authorization services related to the measles vaccines produced in this Project were undertaken by the NRA. In Vietnam, NRA consisting of four agencies²⁰ are

19 So far, the required vaccine for large scale campaigns has been imported with the funds from GAVI, UNICEF and WHO.

20 Four agencies include Drug Administration of Vietnam (DAV), Department of Science and Training (DST), Vietnamese Administration of Preventive Medicine (VAPM) of the Ministry of Health, and National Institute for Control of Vaccine and Biologicals (NICVB). At the time of planning, CENCOBI (current NICVB) were responsible for all the six functions as NRA, and

responsible for six approval and authorizations functions²¹. However, NRA has not acquired accreditation from WHO so far²². Following the unofficial assessment by WHO in December 2008, another unofficial assessment was conducted in May 2011. The relevant agencies are to undertake necessary steps towards official assessment based on the roadmap for strengthening the NRA, which was formulated in May 2011. At the same time, POLYVAC is planning to confirm the quality of measles vaccines by the GMP assessment, which is conducted every two years (the next one will be conducted in 2012), and to prepare for applying the pre-qualification from WHO. In order to achieve it, it is desirable for the government to acquire the accreditation of the NRA from WHO as early as possible.

(2) Proportion of Annual Supply Amount of Measles Vaccines by POLYVAC to the Total Supply Amount of Measles Vaccines in Viet Nam

Table 5 - Annual Supply Amount of Measles Vaccines produced by POLYVAC against the Total Supply Amount of Measles Vaccines in Viet Nam

Indicators (unit)	2009 Actual	2010 Actual	2011 Actual
Purchased Amount of POLYVAC Measles Vaccines by MoH (million doses)	1.3	2	3.2 (Note 2)
Imported vaccines supplied by GAVI (million doses)	1.74	1.58	1.7
Imported vaccines supplied by UNICEF/WHO (million doses)	0	8.1 (Note 1)	0
Total (million doses)	3.04	11.68	4.9 (Note 3)
Ratio of POLYVAC vaccines against the total supply in Viet Nam (%)	43	Regular vaccination only: 56 Including campaign: 17	65

Source: Questionnaire Answer from NIHE and EPI Plan for 2011, NIHE.

Note 1: Campaigns were implemented for 7.3 million of 1-5 year old children.

Note 2: While the annual production amount is 3.3 million doses per year, the purchased amount of POLYVAC vaccines by the Ministry of Health is 3.2 million doses per year.

Note 3: 4.9 million doses per year is the total amount calculated based on the target population of 3 million persons, which the Ministry of Health planned.

those functions had been strengthened by the assistance by WHO. However, due to the change of the policy of the government of Viet Nam, the above departments of the Ministry of Health and NICVB became responsible for the functions, thus the process for strengthening NRA is behind the original schedule. Authorization by two committees, the Ethics Committee and the Licensing Committee, is also the requirement for NRA, but the problem of conflict of interests between the members of the two committees has been pointed out by WHO, and they have been receiving guidance from WHO.

21 Six functions include the followings: authorization/approval of clinical trials, marketing authorization and licensing activities, GMP regulatory inspection, laboratory access, NRA lot release, and post-marketing activities including surveillance of adverse events following immunization.

22 It was also agreed in the Minutes of Discussion at the time of planning that the government of Viet Nam would obtain accreditation for NRA.

POLYVAC is a sole manufacturer for measles vaccines in Viet Nam²³. As shown in Table 5, the proportion of supply of POLYVAC vaccines to the total supply in Viet Nam is increasing from 2009 to 2011 year by year as long as the regular vaccination is concerned. Although the second dose of vaccines will be provided by GAVI up to the year of 2011, all the vaccines for regular vaccination except the second dose has been procured by POLYVAC.

3.3.2 Qualitative Effects: Technical Production Capacity

As mentioned in the section of efficiency, technical guidance was provided in this Project regarding the three steps of validation (Design Qualification, Installation Qualification and Operation Qualification), and the POLYVAC staff acquired the related skills by the project completion. In addition, GMP related documents required for obtaining a facility license were prepared, and POLYVAC obtained the facility license from the NRA one month after the project completion in April 2006. Furthermore, POLYVAC passed a GMP assessment for the first time in 2008 during the Technical Cooperation Project, and as a result, POLYVAC came to be able to sell measles vaccines on the domestic market in 2009.

3.3.3 Synergetic effect with Technical Cooperation Project and other contributing factors

This Project and the Technical Cooperation Project for Strengthening Capacity for Measles Vaccine Production (hereinafter refers as “TC Project”) share the same objective of producing and of supplying the measles vaccines which match with the GMP in stable manner. This objective was achieved only three years after the project completion by providing the facility and the equipment with this Project and by establishing the production and quality control technology skills with the TC Project. For the successful achievement of the above objective, there were various partnerships with other organizations and linkage with other cooperation forms including the TC Project even before the planning of this Project and until the implementation of the TC Project.

- 1) In 1990’s, the government of Japan provided POLYVAC with equipment for establishing the production technology of polio vaccines. POLYVAC had established a production technology of polio vaccines before the commencement of this Project, which contributed to the smooth establishment of production technology of measles vaccines which is similar to that of polio vaccines.
- 2) Since 1997, the essential staff required for the measles vaccine production including the Director and the managers of each department had received training regarding the

²³ In Viet Nam, four national vaccine manufacturers such as POLYVAC, IVAC, VABIOTEC and Darat Vaccine Center produce nine kinds of vaccines, and they produce different kinds of vaccines exclusively.

measles vaccine production and quality control in the Kitasato Institute, from the experts, who were involved in the soft component of this Project and the TC Project, thereby having built a mutual trust essential for smooth technical transfer prior to this Project and the TC Project;

- 3) In 2002, POLYVAC and the Kitasato Institute signed the technical transfer agreement on the measles vaccines production and the seed virus (AIK-C Strain);
- 4) The MoH, POLYVAC, WHO and the Kitasato Institute exchanged opinions closely and formulated the plan of this Project;
- 5) The expert in the Kitasato Institute, who had been a member in the mission of the Basic Study of this Project, was involved in the soft component of this Project as a process licensor. The ten experts in the soft component were involved in the TC Project. Through their commitment in the whole process, the blue print of this Project from the beginning to the success in GMP assessment was shared with the implementing agency and implemented steadily; and
- 6) The preparation of the plan for the TC Project had already started before the completion of this Project, and the technical transfer required for GMP assessment went smoothly because the TC Project started just after this Project completion.

In light of the above, this project established the physical and technical production capacity of 7.5 million doses per year of measles vaccines and achieved its objective to provide stable supply of the vaccines. Synergy effect with other projects has also been observed, and the indirect effect indicators almost achieved those targets as described later. On the other hand, the annual production quantity of measles vaccines is equivalent to 44% of its target at the time of planning or to 67% of its demand at the time of ex-post evaluation. The reason why the production amount remains 67% of its demand is that imported vaccines have been used for the second dose of regular vaccination, and this is an external factor for the executing agency. However, considering the facts that POLYVAC had acquired production capacity of 7.5 million doses per year of measles vaccines and that it obtained sales license by November 2009, the government could have decreased imported vaccines for regular vaccination in consultation with GAVI and increased the purchase amount of measles vaccines manufactured by POLYVAC as a counter-measure for 2010 and beyond. In light of the above, the effectiveness of the project is fair.

3.4 Impact

3.4.1 Intended Impacts

At the time of planning, it was expected that the project would contribute to the improvement in the followings: 1) target population of the two-dose vaccination, actual vaccinated population

and vaccination rate; and 2) infant vaccination rate, cases of measles including adults, prevalence rate and mortality rate caused by measles.

Although it is difficult to evaluate to what extent this Project has contributed to the indicators of the indirect effects at present, the indicators of the indirect effects almost achieved those targets as described below. The reason why it is difficult to evaluate the contribution is that the immunization by using the vaccines produced by POLYVAC started after POLYVAC obtained its sales license in November 2009 and that it is possible to measure the contribution after 2010 at the earliest. However, as described in page 11, there is a possibility that this Project will contribute more in the future because the proportion of supply of POLYVAC vaccines to the total supply in Viet Nam is increasing year by year, and it is also expected to increase in 2011.

3.4.1.1 Two-dose vaccination target population, actual vaccinated population and vaccination ratio

Table 6 shows the target population for two-dose vaccination, actual vaccinated population and vaccination ratio.

Table 6 - Target population for two-dose vaccination, vaccinated population and vaccination ratio

Indicators (unit)	2001 Actual	2002 Actual	2003 Actual	2004 Actual	Target for 2005 -2010	2005 Actual	2006 Actual	2007 Actual	2008 Actual	2009 Actual	2010 Actual
Target population (persons)	2,200,000	9,000,000	11,000,000	1,000,000	2,400,000	NA	1,471,146	1,351,164	1,228,861	1,526,671	1,536,461
Vaccinated population (persons)	288,902	6,640,859	NA	NA	>2,280,000	NA	1,466,129	1,244,860	1,175,120	1,471,627	1,500,635
Vaccination Rate (%)	13.1	73.8	NA	NA	>95%	NA	97.9	92.1	95.6	96.4	97.7

Source: The target for 2005-2010 is from the Ex-ante Evaluation Summary. Actual figures are from the questionnaire answer from NIHE.

Note 1: The actual target population for two-dose vaccination between 2001 and 2004 was the children between nine-month old and ten year old. The target for target population for two-dose vaccination for 2005 and 2010 at the time of planning was the total of 1.8 million five-year-old children in the whole country and the total of 0.6 million six to ten year-old children in the high-risk area; 2.4 million children in total.

Note 2: The target population in 2002 and 2003 are more than that in other years because campaigns were carried out in the country.

As shown in Table 6, against the plan of target population of the two-dose vaccination for 2005-2010 (2.4 million persons per year), the actual target population between 2006 and 2010 was approximately 1.5 million persons per year, which is smaller than that of planning. The reasons are the followings. The target population for two-dose vaccination for 2005-2010 included the total of 1.8 million five-year-old children in the whole country and the total of 0.6 million six to ten year-old children in the high-risk area; 2.4 million children in total. However, as mentioned in the section of relevance, because the total of 1.2 million children of one to two year-old and six to ten year old in the high-risk area were no longer included in the target population of regular vaccination, the target population for two-dose vaccination became only

five-year-old children in the whole country. In addition, regarding the target population for two-dose vaccination, the total of 1.8 million five-year-old children was estimated at the time of planning. However, according to the data after 2006, the actual target population varies between 1.2 and 1.5 million children under six.

Meanwhile, the target of 95% for the vaccination rate was achieved between 2006 and 2010 except in 2007. The reason why the vaccination rate in 2007 was 92.1%, which went below its target, was the delay in the import process of the vaccines²⁴. This shows the necessity of producing measles vaccines domestically.

3.4.1.2 Infant vaccination rate, cases of measles, prevalence rate and mortality rate caused by measles

Infant vaccination rate, cases of measles, prevalence rate and mortality rate caused by measles are shown in Table 7. Infant vaccination rate achieved its target for 2010. In addition, the mortality rate was zero between 2005 and 2010, and achieved its target for 2010. On the other hand, the number of measles cases cannot be compared with a target because a target was not established. Since outbreaks occur every five years after 2000, there are still urgent needs for vaccination of measles. The reason why the prevalence rate could not achieve its target was because an outbreak occurred between 2009 and 2010.

Table 7 - Infant vaccination rate, cases of measles including adults, prevalence rate, and mortality rate caused by measles

Indicators (unit)	1996 Actual	1997 Actual	1998 Actual	1999 Actual	2000 Actual	2005 Actual	2006 Actual	2007 Actual	2008 Actual	2009 Actual	2010 Target	2010 Actual
Infant vaccination rate (%)	96.0	96.0	95.8	93.8	96.6	98.6	96.4	87.9	95.6	96.4	>95%	97.7
Suspected cases of measles (persons)	5,156	6,507	6,507	13,511	17,436	11,604	6,461	5,286	3,425	23,056	NA	15,196
Confirmed cases of measles (persons)	NA	NA	NA	NA	NA	410	1,978	17	352	7,818	NA	3,404
Prevalence rate (per 100 thousand persons)	6.8	8.6	13.2	17.7	21.2	0.5	2.4	0.02	0.41	6.22	<1.0	3
Mortality rate (per 100 thousand persons)	9	0	8	18	10	0	0	0	0	0	<1.0	0

Source: Actual figures between 1996 and 2000 as well as the target for 2010 are from Ex-ante Evaluation Summary. The figures for the suspected cases between 2008 and 2010 are from “Measles and Rubella cases confirmed by laboratory and others, Viet Nam, 2003-2011”, WHO, 2011. The figures for the confirmed cases between 2005 and 2008 are from the above WHO document and the questionnaire answer from NIHE. The figures for the confirmed cases for 2009 and 2010 are from the above document from WHO.

Note: The prevalence rate is the figure calculated by NIHE based on the number of confirmed cases.

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

No major problem has been observed regarding the impacts on the environment. Every year, POLYVAC has passed the environmental inspection by the Hanoi People’s Committee. Among

²⁴ Source: Interview with NIHE.

the Working Groups which will be explained in the section of sustainability later, Environment Pollution Management Working Group and Environment Monitoring Working Group are responsible for environment issues.

3.4.2.2 Land Acquisition and Resettlement

There was no resettlement of residents. No problem has been observed with the land acquisition process.

3.4.2.3 Impacts on the Research and Development of Rota Virus Vaccines

Since 2000, POLYVAC has promoted research and development of vaccines against Rota Virus, which induces diarrhea. It was confirmed that the knowledge and experiences in GMP management, which was acquired through this Project and the TC Project, is useful in the research and development of Rota Virus vaccines. In Viet Nam, about half cases of diarrhea of under-five children have been caused by Rota Virus. The vaccines against the Rota Virus has not been produced domestically, thus vaccines of seven dollar per dose has been imported²⁵. POLYVAC is currently applying to the MoH for the manufacturing and sales license of the Rota Virus vaccines. If POLYVAC obtains the license, then it is possible to supply the vaccines at the reasonable price in stable manner as a single manufacturer for the vaccines in Viet Nam.

In light of the above, the indicators of the indirect effects almost achieved those targets.

Since it is possible to measure the contribution of this Project to the achievement of the impact indicators only after 2010, it is difficult to evaluate it at present. However, there is a possibility that this Project will contribute more to the impact indicators in the future because the proportion of supply of POLYVAC vaccines to the total supply in Viet Nam has been increasing year by year. As other impact, the knowledge and experiences in GMP management, which has been obtained by this Project, have been applied in the production and management of other types of vaccines. No particular negative effects were observed.

3.5 Sustainability (Rating:③)

3.5.1 Structural Aspects of Operation and Maintenance

Whereas the number of staff working for measles vaccine production was sixty three at the time of planning, that of the time of ex-post evaluation is sixty four. The number of staff meets the requirement in carrying out operations in accordance with the GMP. The GMP management consists of the three departments: Project Management (PM), Quality Control (QC) and Quality Assurance (QA), and the responsibility of each department is clear. Seven working groups²⁶ are

25 Source: Interview with WHO.

26 Established working groups so far include the followings: 1) Calibration/validation, 2) Formalin

responsible for each specialized mandate in cooperation with the above departments. For example, Risk Management Working Group, in collaboration with QC and other related departments, identifies the causes of anomalies and deviations, discusses and decides the counter-measures and preventive measures, and shares the decisions and the information in the organization.

3.5.2 Technical Aspects of Operation and Maintenance

All the required documents for GMP such as the Standard Operating Procedures (SOP) and validation have been prepared, and the operations have been almost carried out in accordance with the GMP. GMP assessment is conducted every two years, and POLYVAC passed twice in 2008 and 2010. The next GMP assessment will be the first one after the TC Project and the follow-up cooperation, thus it will become a touchstone for the future of POLYVAC.

As contributing factors for POLYVAC to maintain such high skills, the following three points were identified:

- 1) two-thirds of the staff working in the measles vaccine production is the staff who has experiences in the production of polio vaccines;
- 2) the staff has strong commitment and motivation for learning as know from the fact that the staff turn-over rate is low²⁷ and that they learn Japanese from their own motivation; and
- 3) the staff has been keen to observe the GMP strictly under the supervision of the Kitasato Institute during the TC Project and the follow-up cooperation.

On the other hand, at the time of Terminal Evaluation of the TC Project, following challenges remained for POLYVAC: the response to anomalies and deviations, reasonable materials and test kits for the reduction of production costs, and change validation in the production process. For this objective, the follow-up cooperation for technical transfer was implemented between April 2010 and March 2011. The situation in the last half year is described as below.

- 1) Production record and sanitation record in the final production process have been continuously kept in daily operation;
- 2) In the late 2010, anomalies and deviations occurred due to the biological contamination during the bulk production process. Because the response was not satisfactory, guidance was provided for investigating causes and for taking steps to

Fumigation, 3) Environmental Pollution Control, 4) Environment Monitoring, 5) Procurement Control, 6) Risk Management, 7) Document Control, 8) Clinical Trial, and 9) Pre-qualification. WG-2 and WG-8 finished their tasks, and WG-9 was established in 2010.
27 0.017% excluding the retired.

prevent similar incidents in future by the Japanese experts during the follow-up cooperation. The direct cause was that the top of the culture bottle was loose, and the indirect cause was that the young staff was in charge of the process after the retirement of the skilled staff;

- 3) Change validation has been almost properly conducted in accordance with the change control procedure. However, for example, a trouble occurred because the procedure was not followed before changing the manufacturer of test materials for the bulk production. During the follow-up cooperation, it was instructed to obtain test lot in advance and to follow change control procedure;
- 4) Training has been conducted in accordance with the annual training plan. Because the individual training records had not been fully filled, it was recommended in the follow-up cooperation report that format of the individual training records be improved in order to understand better the skill level of each person.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Cash Flow Status of POLYVAC

The production and procurement plan for EPI vaccines are managed by NIHE under the supervision of the MoH, thus POLYVAC receives orders from NIHE and supplies NIHE with the products. POLYVAC is supposed to cover the O&M costs by the revenue. There is no plan for privatization for the time being. In case that the financial situation becomes worse, it is expected that the government provides support. Cash flow statement of POLYVAC is shown in Table 8.

Table 8 - Cash Flow of POLYVAC

(Unit: million VND)

	Items	2008	2009	2010	Prospect for 2011
Income	Subsidy from MOH	16,000	12,273	0	0
	Total Sales Income	9,284	16,351	23,802	34,864
	Measles vaccines	NA	7,109	10,983	16,667
	Polio vaccines	NA	6,585	11,235	16,397
	Other income	NA	2,657	1,800	1,800
	Total Income		25,284	28,624	23,802
Expenditure	Operation cost	24,684	27,637	25,070	28,646
	Maintenance cost	582	727	619	954
	Total Expenditure		25,266	28,364	25,689
Surplus/Deficit		18	260	-1,887	5,264

Source: POLYVAC Questionnaire Answer

As shown above, although there have been surpluses from operating activities in 2008 and 2009, POLYVAC experienced deficit in 2010. The reasons for deficit include the

followings: sales of measles vaccines remained as little as 200 million doses, and the counterpart funds from the MoH were terminated along with the completion of this Project and the TC Project. However, it is expected that surpluses equivalent to twenty million JPY is created along with the increase in sales to 3.2 million doses in 2011. Furthermore, as GAVI will terminate its assistance in providing imported vaccines in 2012, there is a prospect that sales income will increase along with the increase in sales after 2013. After 2013, if MR vaccines are introduced and if POLYVAC cannot produce MR vaccines, then its income may decrease. On the contrary, if environment enables POLYVAC to produce MR vaccines, its income may increase because the unit price of MR vaccines is higher than that of measles vaccines.

Looking at POLYVAC as a whole, the income from polio vaccine department is stable. It can be judged that management base of POLYVAC may not be at risk even if measles vaccine department experiences slight deficit.

The production costs and purchase price are shown in Table 9. The estimated production cost at the time of planning (twenty four JPY), is almost the same as the estimated production cost (twenty two JPY) as of now based on the case of producing the full capacity of 7.5 million doses per year. However, because the annual production quantity remains as little as two to three million doses per year, the actual production cost is estimated twice or more than the planned costs. The reason why the production costs are expensive is that the many kinds of test reagents were imported from Japan.

During and after the follow-up cooperation, POLYVAC has been trying to reduce the production costs through the change validation of test reagents and kits. Nevertheless, there is a limitation due to the following reasons: 1) the order remains as little as two to three million doses; and 2) it is necessary to take required steps to replace test reagents and to change production process in order not to cause anomalies and deviations from the GMP.

Table 9 – Unit price of production costs and purchase price

	Unit price of production cost			Sales price approved by the Ministry of Finance	Purchase price by MoH in 2010
	Estimate at the time of planning	In the case 5 million doses are produced	In the case 7 million doses are produced		
VND	NA	9,474	5,674	7,420	5,491
JPY	24	37	22	29	21

Source: The estimate is from the Basic Design Report, and others are from documents by POLYVAC.

Note: The estimate at the time of planning is that estimated based for the second year and beyond after the integrated production from seed virus started. The actual JPY was calculated based on the following exchange rate: 1 VND = 0.003890 JPY as of April 2011.

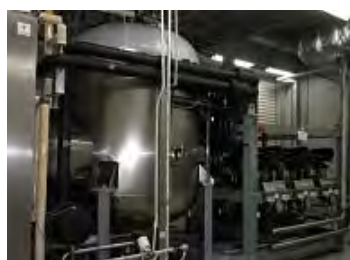
Although POLYVAC needs to make continuous efforts in reducing production cost, it can be

said that there is no problem in financial aspect for the following reasons: 1) there have been surpluses from operating activities in the past four years except 2010; 2) it can be judged that surpluses are secured if the current level of production amount (3.2 million doses/year) is maintained; 3) the management base of POLYVAC is stable as a whole; and 4) in case that the financial situation becomes worse, it is expected that the government provides support.

3.5.4 Current Status of Operation and Maintenance

Cleanliness of the facility, control of areas in accordance with the bio-safety, and wearing protective suits are strictly maintained. The equipment, spare-parts, raw materials and consumables are properly managed by the control system. The procurement of the materials and spare-parts are controlled by the Procurement Management Working Group appropriately. In general, operation and maintenance status of the facility and equipment is satisfactory. Although there are following problems, actions have been undertaken by either POLYVAC itself or under the follow-up cooperation, thus those problems are expected to be solved.

- 1) Some problems such as the distortion of connection pipes due to the subsidence of the buildings without bearing piles along with the land subsidence in Hanoi City, the distortion of drainage pipes along with the land subsidence in the compound, cracks in the buildings, etc. In order to respond to these issues, the follow-up cooperation for facility and equipment was implemented from January 2011 to August 2011;
- 2) one of the CO₂ incubators has not been used because the grass door is broken, but it can be used after the grass door is provided by the follow-up cooperation;
- 3) Because Incubator D could not perform the expected functions at the Performance Qualification (PQ) test, it has not been used. POLYVAC purchased the same type of incubator, and has been using. Incubator D has been used for drying grass equipment in the cleansing room in the QC Department.; and
- 4) There was no job register of the calibration equipment, thus the Japanese consultant instructed the staff to prepare a job register during the follow-up cooperation.



Freeze Dryer



Indicators of temperature of each facility



Shelf of spare-parts with spare-parts list

In light of the above, sustainability of the project is fair considering the following three aspects: 1) in the past six months, the response to anomalies and deviations was not satisfactory, and validation for reducing production cost was not properly carried out in accordance with the change control procedure, but no major technical problems are currently observed; 2) although POLYVAC needs to make continuous efforts in reducing production cost, there is no major problem with the financial aspect; and 3) although there are some problems with the status of the O&M, those are expected to be solved by the follow-up cooperation and so on.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

This project has been highly relevant with the Viet Nam's development plan and Japan's ODA policy. Regarding development needs, there is a gap between the amount of measles vaccines which was regularly required at the time of planning and that of the time of ex-post evaluation. However, considering comprehensively that the number of cases of measles is still the highest among the six major infectious diseases of children at the time of ex-post evaluation, that outbreaks occur every few years, that the urgency of the project for providing stable supply of domestic measles vaccines is high and that the decrease in the required amount is due to the external factor which was not expected at the time of planning, it can be said that its relevance is high. Both project cost and project period were mostly as planned, therefore efficiency of the project is high.

This project established the physical and technical production capacity of 7.5 million doses per year of measles vaccines, which meet the World Health Organization (WHO) - Good Manufacturing Practice (GMP), and achieved its objective to provide stable supply of the vaccines. Synergy effect with other projects has also been observed. On the other hand, the annual production quantity of measles vaccines at the time of ex-post evaluation is approximately 3.3 million doses, which is equivalent to 44% of its target at the time of planning or to 67% of its demand (required amount for regular vaccination) at the time of ex-post evaluation. The reason why the production amount remains 67% of its demand is that imported vaccines have been used for the second dose of regular vaccination, and this is an external factor for the executing agency. However, the government could have decreased imported vaccines for regular vaccination and could have increased the purchase amount of measles vaccines manufactured by POLYVAC as a counter-measure for 2010 and beyond. Although it was confirmed that it is possible that the annual production amount increases in the future, the effectiveness of the project at present is fair. Since it is only after 2011 when it is possible to measure the contribution of this Project to the achievement of the impact indicators, it is difficult to evaluate it at present. However, the indicators of the expected positive indirect effects such as the ratio of two-dose vaccination of measles almost achieved those targets. No

major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high. In light of the above, this Project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendation to POLYVAC

Continuous efforts in enhancing the response to anomalies and deviations, reducing the production cost and human resource development (Effectiveness and sustainability)

It is recommended for POLYVAC to make continuous efforts towards the GMP inspection in 2012, paying attention to the learning from the follow-up cooperation including the following three points:

- 1) to strictly follow the change control procedure without fail before replacing materials with more reasonable ones in order to prevent anomalies and deviations;
- 2) to repeat in-house training in accordance with the annual training plan as well as to develop the staff who are expected to teach subordinates in future; and
- 3) to improve the formats of the training records in order to understand the individual technical level properly.

4.2.2 Recommendations to the Ministry of Health (MoH)

(1) Review of purchase price of measles vaccines

If the purchase amount of measles vaccines from POLYVAC by MOH continues to be limited and if POLYVAC continuously experiences deficit, it is recommend for MOH to consider increasing the purchase price.

(2) Efforts for Strengthening National Regulatory Authority (NRA)

It is recommended for the MoH to make further efforts in obtaining the accreditation of the NRA in accordance with the roadmap for strengthening NRA, which was agreed in May 2011.

(3) Build a framework for introducing MR vaccines

As mentioned in the section of relevance, there is an urgent need for preventing not only measles but also rubella. If the government of Viet Nam officially adopts a policy to replace the second dose of measles vaccines with MR vaccines after 2013, it is required to build a framework to implement the policy. For example, it is required to precisely estimate the MR vaccines amount based on the target population, to review how to obtain the vaccines, to estimate the cost and to secure the budget, to provide a domestic vaccine manufacturer with technical and financial support required for establishing technology in

producing MR vaccines, and to secure required budget for purchasing domestically produced vaccines.

4.2.3 Recommendations to JICA

- (1) Assistance in building a framework for introducing MR vaccines (Effectiveness and sustainability)

If there is a request from the government of Viet Nam for establishing a production technology of MR vaccines in a domestic vaccine manufacturer, it is one of ideas for JICA to consider transferring the production technology of MR vaccines from the perspectives of effectiveness and sustainability.

- (2) Strengthening National Regulatory Authority (NRA)

In cooperation with the government of Viet Nam, WHO and UNICEF, it is recommended for JICA to support four relevant agencies of NRA in taking necessary steps in stable manner towards the NRA official assessment along with the roadmap for strengthening NRA.

Viet Nam

Ex-post Evaluation of Japanese ODA Grant Aid Project
“The Project for the Groundwater Development in Rural Part of
Northern Provinces in Viet Nam”

External Evaluator: Junko Miura, Global Link Management

0. Summary

This Project is highly relevant to the country’s development plan and development needs, both at the time of planning and at the time of ex-post evaluation. The Project was also in line with Japan’s ODA policy at the time of planning. Hence, its relevance is high. The Development Study, which was conducted ahead of this Project, assisted this Project to narrow down the target area from 20 communes to 12 communes in light of needs and feasibility. Thus, the target area was properly selected. Efficiency is rated high since the expected output was obtained as planned within the planned project cost and period. This project has somewhat achieved its objective, namely the stable supply of safe water (population served and its percentage against the total population, maximum/average water supply amount per day, etc), and the provided equipment by this Project has been fully utilized. However, there are some minor problems; 1) some indicators are not up to the expectation in some communes; 2) non-revenue water rate is high in general; and 3) there is some room for improvement in water quality, therefore its effectiveness is fair. Some problems have been observed in terms of financial aspects and current status of operation and maintenance, therefore, sustainability of the project is fair. In light of the above, this Project is evaluated to be satisfactory.

1. Project Description



Project Location



Water Plant in Van Thang, Thanh Hoa

1.1 Background

The project target areas are located in the rural areas. As there was no public water supply facility in those areas in 2001, most residents used groundwater from shallow wells (five to ten meter depth), surface water from river, lake and ponds, and rain water. In the dry season which

lasts for six months, 20-80 % of the shallow wells dried up. Poor water quality of shallow wells caused water-borne diseases such as diarrhea, sore eye and skin diseases.

The Viet Nam's Rural Social and Economic Development Plan in 1996 highlighted the importance of the groundwater development in the five Northern Provinces. However, due to the lack of data regarding the needs and feasibility, the Government of Viet Nam (GoVN) and the Government of Japan (GoJ) signed an agreement on the Scope of Works of the Development Study for the Groundwater Development in the Northern Provinces.

The Development Study for Groundwater Development in the Rural Part of Northern Provinces was implemented between 1998 and 1999 with the following components: a) to investigate ground water quality and situations in the twenty communes¹; b) to formulate a Master Plan for the groundwater development towards 2010; and c) to conduct a feasibility study² in the fifteen communes including this project's target areas. In order to achieve the groundwater development project in the above areas, GoVN requested GoJ for a grant aid project in July 1997.

1.2 Objective

The objective of this project was to provide stable supply of safe water in the total of eleven locations in the twelve communes³: four communes in Thai Nguyen Province, three communes in Ninh Binh Province and five communes in Thanh Hoa Province by drilling deep wells, constructing the water treatment facility, chlorination facility and distribution ponds and installing the distribution and house-connection pipes. The location of the project site and the project summary are shown in Figure 1 and Table 1.

-
- 1 The Master Plan planned to construct water plants by groundwater development from the beginning. As a result of groundwater survey, it was found that groundwater development was difficult in the five communes out of twenty communes, the four communes in Ha Tinh Province and Nong Cong Town in Thanh Hoa Province, because of insufficiency and salination of groundwater. Therefore, these five communes were removed from the target areas of this Project.
 - 2 After the Feasibility Study, communes in the suburbs of Hanoi City were removed from the target areas of this Project due to the following reasons: 1) those communes were located in the target areas of the next phase of the water development project of Hanoi City; and 2) there was a high possibility that the water project would be managed by Hanoi Water Company, not by communes.
 - 3 Thai Nguyen Province: Hoa Thuong, Dong Bam, Thinh Duc, Nam Tien, Ninh Binh Province: Dong Phong, Quang Son, Yen Thang, Thanh Hoa Province: Vinh Thanh, Vinh Loc, Dinh Tuong, Van Ha, and Van Thang. Because Vinh Thanh and Vinh Loc communes share one water plant, the number of water plants is eleven.



Figure 1 Location of Project Site

Table 1 Project Summary

Grant Limit/ Actual Grant Amount	2,056 million yen / 2,043 million yen
Date of Exchange of Notes	Term I: July 2002, Term II: July 2003, Term III: July 2004
Implementing Agency	Center for Rural Water Supply and Environmental Sanitation (CERWASS), Ministry of Agriculture and Rural Development (MARD)
Project Completion Date	Term I: February 2004, Term II: February 2005, Term III: January, 2006
Main Contractors	Construction: Hazama Corporation, Equipment: Mitsubishi Corporation
Main Consultants	Joint Venture: Docon Co., Ltd. and Pacific Consultants International
Basic Design	“Basic Design Study on the Groundwater Development Project in Rural Part of Northern Provinces” May 2001-December 2001
Detailed Design	July 2002- December 2004
Related Projects	Development Study “Groundwater Development in Rural Part of Northern Provinces” (1998-1999)

2. Outline of the Evaluation Study

2.1 External Evaluator

Junko Miura, Global Link Management Inc.

2.2 Duration of the Evaluation Study

Duration of the Study: From December, 2010 to November, 2011.

Duration of the Field Study: From April 3rd to April 17th, 2011 and From July 4th to 15th July, 2011.

2.3 Constraints during the Evaluation Study

No particular constraint was identified.

3. Results of the Evaluation (Overall Rating: B⁴)

3.1 Relevance (Rating: ③⁵)

3.1.1 Relevance with the Development Policy of Viet Nam

At the time of planning, the objectives of the Viet Nam's "National Rural Water Supply and Sanitation Strategy up to 2020" approved in 2000 were the followings: 1) more than 85% of the rural people have access to the safe and clean water of 60ℓ/day per person by 2010; and 2) 100% of the rural people have access to the water of the same quality and the quantity by 2020.

At the time of ex-post evaluation, the above strategy remains as a basic policy. In addition, the National Target Program for Rural Water Supply and Sanitation (NTP) III for 2011-2015 was formulated in 2010. The NTP III outlined the following specific targets: 1) 95% of the rural people have the access to the safe and clean water of 60ℓ/day per person at least by 2015; and 2) more than 65% of the rural people have the access to the water of 60ℓ/day per person at least, which meets the QCVN02/2009-BYT (the national water quality standard applicable for water plants with the capacity of less than 1,000 m³/day), by 2015.

3.1.2 Relevance with Development Needs of Viet Nam

At the time of planning, there was no public water supply facility in the target areas. Many families utilized shallow wells, water from lake, river, ponds and rain water. In the dry season which lasts for six months, 20-80 % of the wells dried up. Poor water quality of some shallow wells caused water-borne diseases such as diarrhea.

At the time of ex-post evaluation, some families use both tap-water from the project facility and other water sources. However, in dry season, because shallow wells dry up, more families utilize tap-water. In some areas, due to the bad quality of other water sources, some families use only tap-water or utilize tap-water for drinking and cooking. Therefore, there is a high needs for safe and clean water.

3.1.3 Relevance with Japan's ODA policy

At the time of planning, the top priorities of the Japan's ODA policy towards Viet Nam (2002) were human resource & institutional development, upgrade of economic infrastructure such as electricity and transportation, development of agriculture and rural areas, education & health and medical systems, and environment. Assistance for water supply in rural areas was included in the development of agriculture and rural areas, thus this Project was consistent with the Japan's ODA policy towards Viet Nam.

4 A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, and D: Unsatisfactory.

5 ③:High, ②:Medium and ①:Low.

When some officials of the CERWASS were interviewed, they pointed that the durability and permanence of the facility and equipment could be identified as some reasons for the comparative advantage of Japanese assistance over the other donors in the water sector in Viet Nam.

This project has been highly relevant with Viet Nam’s development plan, development needs as well as Japan’s ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

All facilities were constructed almost as planned by both Japanese and Vietnamese side. The facilities of water production capacity of 7,490 m³/day in total were constructed as planned. The output of the project is shown in Table 2. Out of the total twenty two wells, nine wells which were dug as test wells in the Development Study are utilized as intake wells (40% of the total intake wells). Thirteen wells were newly constructed. The utilization of the existing facilities contributed to the efficiency of the project.

Table 2 Output (planned and actual)

	Planned	Actual
Japanese Side	<ul style="list-style-type: none"> - Deep wells, submersible intake pumps, pump houses, raw water transmission pipes - Treatment plants, chlorination - Reservoirs, distribution pumps, elevated tanks - Installation of distribution pipes - Block service pipes, house-connection service pipes, water meters (materials only) - Well-drilling equipment 	<p>Almost as planned. There is no cancellation or addition of outputs. The locations of some wells were shifted slightly and the conveyance/distribution pipes were extended or shortened slightly. Sludge removal bulbs were replaced by sludge removal pumps.</p>
Vietnamese Side	<ul style="list-style-type: none"> - Land acquisition and leveling work - Access roads construction - Temporary land use for the storage - Construction of gates and fences - Public electricity supply works - Drainage works - Installation of block service pipes and house-connection services pipes and water meters 	<p>As planned</p>

Source: Basic Design Report (2001) and Questionnaire Answer.



Signboard
(Dong Bam, Thai Nguyen)



Distribution Pump
(Hoa Thuong, Thai Nguyen)



Water Plant and Staff
(Nam Tien, Thai Nguyen)

3.2.2 Projects Input

3.2.2.1 Project cost

The Japanese Grant ceiling amount at ex-ante was 2,056 million yen and local funds equivalent to 179 million yen was to be provided by the Government of Viet Nam (GoVN) as counterpart funds. The actual cost was 2,043 million yen from the Japanese Grant and local funds equivalent to 163 million yen from the GoVN. The actual total project cost was within the plan (98.7% of the planned cost).

3.2.2.2 Project period

The planned project period was 36 months from July 2002 to January 2006.

Both project period and the project cost were mostly as planned; therefore, the efficiency of the project is high.

3.3 Effectiveness (Rating: ②)

3.3.1 Quantitative effects

3.3.1.1 Operational and Effect Indicators

(1) Production Capacity, Maximum/Average Water Quantities and Facility Utilization Rate

The production capacity, maximum/average water quantities and facility utilization rate at the project site are shown in Table 3.

Table 3 Production Capacity and Maximum/Average Water Quantities

Province	Commune	Design Capacity (m ³ /day)	Maximum Water Supply Amount (Actual) (m ³ /day)	Maximum Facility Utilization Rate (Actual) (%)	Average Water Supply Amount (Target) (m ³ /day)	Average Water Supply Amount (Actual) (m ³ /day) (%) shows against the target	Average Facility Utilization Rate (Target) (%)	Average Facility Utilization Rate (Actual) (%)
Thai Nguyen	Hoa Thuong	770	770	100	569	569 (100%)	73.9	73.9
	Dong Bam	600	600	100	441	441 (100%)	73.5	73.5
	Thinh Duc	350	290	82.8	253	190 (75%)	72.3	54.3
	Nam Tien	450	400	88.8	331	300 (91%)	73.6	66.7
Ninh Binh	Dong Phong	980	840	85.7	726	710 (98%)	74.1	72.4
	Quang Son	510	243	47.6	373	196 (52%)	74.0	38.4
	Yen Thang	870	550	63.2	644	500 (78%)	74.0	57.5
Thanh Hoa	Vinh Thanh & Vinh Loc	1,290	1,100	85.3	953	782 (82%)	73.9	60.6
	Dinh Tuong	630	630	100	467	557 (119%)	74.1	88.4
	Van Ha	720	720	100	533	540 (101%)	74.0	75.0
	Van Thang	320	250	78.1	237	167 (70%)	74.1	52.1
Total		7,490	6,393 Against design capacity 85.4%	Average 85.7%	5,527 Against design capacity 73.8%	4,952 Against design capacity 66.1% Against Plan 89.6%	Average 73.8%	Average 64.8% Against Plan 87.8%

Source: Basic Design Report (2001) and Questionnaire Answer (2011).

At the time of ex-post evaluation, on average, the maximum water supply amount was 85.4% against the design capacity; the maximum facility utilization rate was 85.7%. Whereas the target average water supply amount was 5,527 m³/day (73.8% against the design capacity), the actual was 4,952 m³/day (66.1% against the design capacity), which

was 89.6% of the plan. Whereas the target average facility utilization rate was 73.8%, the actual was 64.8%, which was 87.8% of the target. Hence, on average, it can be concluded that the above indicators have been generally achieved.

On the other hand, three out of twelve communes (Quang Son, Yen Thang and Van Thang) did not reach eighty percent of the target in terms of the maximum water supply amount per day, and four out of twelve communes (Thinh Duc in addition to the above three communes) did not reach eighty percent of the target in terms of the average water supply amount per day. The common reasons why these communes could not reach even eighty percent of the target are the followings: 1) the population served did not grow as expected; and 2) the replacement of the existing water sources for the pipe-borne water did not happen as expected⁶. For the latter, one of the reasons can be that residents use bigger amount of water from existing sources than expected even after the project completion because the existing water sources in the four communes contain little amount of Manganese and Iron. According to the beneficiary survey, for example, five out of ten households in Thinh Duc use the tap-water for drinking, cooking and toilets while they use the water from shallow well for laundry and farming. Meanwhile, specific reason why the maximum water supply amount per day in Yen Thang remains as 63.2% of the design capacity is that one of the three wells is not functioning at the time of ex-post evaluation. Specific reason why the average water supply amount in Thinh Duc did not reach eighty percent of the target is that the intake water has been declining throughout the year compared with the time of project completion (Details are described in the section of sustainability).

(2) Population Served and the Accessibility Ratio to Portable Water

Table 4-6 show the target and actual figures of the population served and the percentage of the population served.

Table 4 Population served and percentage in the four communes
in Thai Nguyen Province (Plan and Actual)

Indicators (unit)	2005 Target	2006 Actual	2007 Actual	2008 Actual	2009 Actual	2010 Actual
Population in the area (person)	29,988	30,204	30,424	30,555	30,867	31,144
Population served (person)	21,755	21,913	22,073	22,234	22,545	22,678
Percentage of population served (%)	72.5	73.0	73.2	73.2	73.5	73.3

Source: Target for 2005 is from the Ex-ante Evaluation Summary Sheet. The actual figures are from Thai Nguyen P-CERWASS.

6 At the time of the Development Study, it was expected that existing water resources would be utilized for farming and livestock and the pipe-borne water would be used for drinking, cooking and shower after the pipe-borne water is supplied. Upon the project completion, the actual consumption of the pipe-borne water was less than 60-70 L/day/person, which was expected at the Development Study.

Table 5 Population served and percentage in the three communes
in Ninh Binh Province (Plan and Actual)

Indicators (unit)	2005 Target	2006 Actual	2007 Actual	2008 Actual	2009 Actual	2010 Actual
Population in the area (person)	28,286	23,734	23,740	23,756	23,770	23,839
Population served (person)	23,770	19,940	20,608	20,591	20,694	20,952
Percentage of population served (%)	84.0	84.0	86.8	86.7	87.1	87.9

Source: Target for 2005 is from the Ex-ante Evaluation Summary Sheet. The actual figures are from Ninh Binh P-CERWASS.

Table 6 Population served and percentage in the five communes
in Thanh Hoa Province (Plan and Actual)

Indicators (unit)	2005 Target	2006 Actual	2007 Actual	2008 Actual	2009 Actual	2010 Actual
Population in the area (person)	34,055	30,120	30,425	30,683	30,972	31,278
Population served (person)	29,862	24,460	24,573	24,799	25,155	25,668
Percentage of population served (%)	87.7	81.2	80.8	80.8	81.2	82.1

Source: Target for 2005 is from the Ex-ante Evaluation Summary Sheet. The actual figures are from Thanh Hoa P-CERWASS.

Thai Nguyen Province achieved the target for 2005 regarding both population served and the percentage one year after the project completion in 2006. While the targeted accessibility ratio to portable water has achieved in Ninh Binh, the population served remained as low as 84% of the target. In Thanh Hoa, the population served remained 81.9% of the plan, and the actual accessibility rate was 81.2% against the target of 87.7%.

The communes, of which populations served went much below the target, are the followings: Quang Son was 64.6% of the plan (the actual population in the area was 49.3% of the plan); Van Thang was 83.1% of the plan (the actual population in the area was same the plan); and Vinh Thanh and Vinh Loc was 64.2% (the actual population in the area was 64.5% of the plan). The common reasons why these communes did not reach their targets may be that more residents continuously use the existing water sources such as wells, lakes/ponds and rain water than expected. Meanwhile, specific reasons are the followings. In Quang Son, at the time of planning, it was expected that staff of the cement factory and their families, approximately 2,000 persons, would receive the water by this Project facilities. However, at the time of ex-post evaluation, those people are receiving water from the plants constructed by the cement factory, thus the population served did not grow as expected. In addition, the surrounding area of the factory is located outside the current administrative area of Quang Son Commune, therefore the total population did not grow as expected.

In Vinh Thanh & Vinh Loc, at the time of planning, it was estimated that the population in the area would be 13,000 persons in 2005 based on the estimate of 11,900 persons in

2001⁷. However, according to the census by the two commune health posts in 2006, which were obtained at the time of ex-post evaluation, the population in the area is 9,070 persons. Due to the different data sources, exact gap analysis could not be conducted.

(3) Average Water Consumption per Person

Table 7 illustrates the average consumption of the pipe-borne water by the project facility per day per person. Out of twelve communes, five communes achieved the objective of providing 60 liters of portable water per day per person for Year 2010, which was set in the Strategy 2020. Four communes also achieved more than 80% of the target, although three communes did not reach 80% of the target. It can be judged that this indicator has been generally achieved.

Table 7 Average Water Consumption per Day per Person

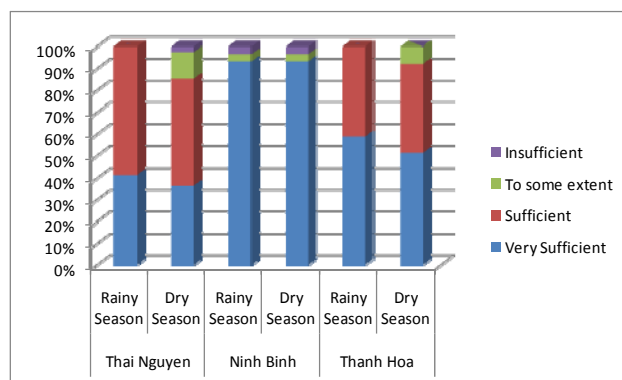
		(unit: liter)					
Province	Commune	2005	2006	2007	2008	2009	2010
Thai Nguyen	Hoa Thuong	NA	NA	NA	80	80	80
	Dong Bam	NA	NA	NA	60	60	60
	Thinh Duc	NA	NA	NA	52	52	52
	Nam Tien	NA	NA	NA	53	53	53
Ninh Binh	Dong Phong	30	35	45	79	79	80
	Quang Son	43	43	39	45	45	60
	Yen Thang	35	43	46	53	54	57
Thanh Hoa	Vinh Thanh & Vinh Loc	NA	NA	22	29	38	46
	Dinh Tuong	NA	NA	24	31	58	65
	Van Ha	52	58	60	54	60	57
	Van Thang	NA	NA	12	14	18	25

Source for the data between 2005 and 2007:

Ex-post evaluation by the Ministry of Foreign Affairs of Japan in 2008 (Original data: Ninh Binh P-CERWASS and Van Ha Commune), Source for 2008-2010: Questionnaire Answer by each P-CERWASS (2011).

Figure 2 shows the customers' satisfaction about the water quantity. According to the beneficiary survey, 80-90% households in all the three provinces responded that the water quantity was "Very sufficient" or "Sufficient". Thus, it can be said that customers are generally satisfied with the water quantity. In Ninh Binh Province, 93.4% respondents feel that water quantity is very sufficient both in rainy and dry season. On the other hand, in Thai Nguyen and Thanh Hoa Province, more respondents feel "very sufficient" in rainy season than in dry season. Some residents living away from the water plant in Thinh Duc and Nam Tien, Thai Nguyen Province, responded that the both water quantity and water pressure were insufficient in dry season.

⁷ Basic Design Report (Original data: Commune People's Committee).



Source: Beneficiary Survey (N=111) ⁸

Figure 2 Customers' satisfaction about the water quantity

(4) Water Supply Hours

Before the project completion, there was no supply of pipe-borne water in the target area. At the time of planning, target water supply hours were not established. Water supply hours by each commune at the time of ex-post evaluation are summarized in Table 8.

Table 8 Water Supply Hours

		(unit: hours)	
Province	Commune	Dry Season	Rainy Season
Thai Nguyen	Hoa Thuong	20-22	12-24
	Dong Bam		
	Thinh Duc	6-10 (Peak hour in the morning, noon and evening only)	7-11 (Peak hour in the morning, noon and evening only)
	Nam Tien	10.5 (Peak hour in the morning, noon and evening only)	16 (Suspension in the night time)
Ninh Binh	Dong Phong		17(5a.m.-9p.m.)
	Quang Son		18(5a.m.-10p.m.)
	Yen Thang		24
Thanh Hoa	All communes		24

Source: P-CERWASSs

After the project completion, water is supplied only in peak hours or water supply is suspended during the night time in the most target areas. Only in Thanh Hoa Province, water is supplied for twenty four hours. In Thinh Duc and Nam Tien, Thai Nguyen Province, water is supplied only six to sixteen hours. According to the beneficiary survey, three out of ten households in rainy season and eight out of ten households in dry season

⁸ The beneficiary survey was conducted in 10 communes out of 12 communes: 4 communes in Thai Nguyen Province, 4 communes in Thanh Hoa Province, and 2 communes in Ninh Binh Province. 48.6% of the respondents are male and 51.4% are female. The age of the respondents ranges from 31 to 83. The respondents are farmers, self-employers, government officials, teachers, housewives, and others. 84% of the respondents connected the pipe-born water in the same year of the project completion.

receive water less than six hours. Thai Nguyen P-CERWASS raised the following reasons why the water supply hours are short in its Province. The intake water has been decreasing since the project completion. Consequently, water is supplied by blocks in shifts and some households at the end of pipeline network cannot receive water. In addition, because the dry season lasted longer than usual in 2010 and the black-out was serious, pumps could not be operated sufficiently due to the black-out.

According to the beneficiary survey, even in Thanh Hoa, where 24 hour water supply area, about 68% residents receive water less than twenty hours. According to the Thanh Hoa P-CERWASS, because water pressure is not sufficient, water is supplied by blocks in shifts. As same as in Think Duc, pumps could not be operated sufficiently due to the frequent black-out in 2010.

(5) Non Revenue Water Ratio⁹

The Non Revenue Water (NRW) ratio in each commune is shown in Table 9. The NRW ratio of each commune in 2011 is between 35 and 51% except Van Ha Commune in Thanh Hoa Province and Quang Son Commune in Ninh Binh Province. The NRW ratio of these communes is judged high for the following reasons: 1) the NRW ratio of these communes is high compared with the ratio of the capitals in other neighboring countries; and 2) the pipes and water meters were newly installed by this Project, and thus the water leakage should be low. According to each P-CERWASS, the reasons for the high NRW ratio include the followings: 1) water leakage, 2) increase of defective meters, 3) aging of water pipes, and 4) steeling. The reasons vary from commune to commune. Water leaks were caused by the expansion of pipeline network after the project completion and by careless cutting of water pipes during the construction of new roads. Increase of defective water meters was caused by aging of pipes and by CaCO₃, which stick to water meter faces. One of the causes of water steeling is that users manipulate their household water meters because the household water meters are installed inside houses particularly in Ninh Binh Province.

On the other hand, the NRW ratio is low in Van Ha because water pipes installed by this Project were not cut by constructing new roads. Construction of new roads and the

9 Non revenue water (NRW) ratio is the ratio of the water that has been lost before it reaches the customer against the water that has been produced. The typical causes include water leakage due to over-aged distribution pipes, illegal connections to pipes, etc. The NRW ratio in the neighboring countries is as follows: 26% in Phnom Penh, 28% in Vientiane, 38% in Ho Chi Minh, and 40% in Dhaka (Data source: Water in Asian Cities, Utilities Performance and Civil Society Views, ADB, 2003. The figure is the data of 2001) . In Siem Reap, the NRW ratio is 34.6% in 2004(project commencement), 26.2% in 2006 (project completion), 12.1% in 2009 (ex-post evaluation) (Data: Ex-post Evaluation Report of the Project for Improvement of Water Supply System in Siem Reap Town”, JICA, 2009). New water pipes were constructed and water meters were installed by this Project, and the executing agency has been conducting NRW measures.

installation of water pipes by the Project were carried out around the same time. In Quang Son, the NRW ratio is declining because the P-CERWASS has carried out preventive measure for leaks by replacing obsolete pipes and defective water meters. Dong Phong and Yen Thanh Commune are considering in re-installing house water meters outside each house in order to prevent water steeling.

Table 9 Non Revenue Water Ratio

		(unit: %)				
Province	Commune	2005	2006	2007	2010	2011
Thai Nguyen	Hoa Thuong	NA	NA	35	NA	37
	Dong Bam	NA	NA	32	NA	35
	Thinh Duc	NA	NA	37	NA	38
	Nam Tien	NA	NA	35	NA	36
Ninh Binh	Dong Phong	40(35)	42(33)	36(30)	38.7	38.6
	Quang Son	(37)	(33)	(33)	NA	25
	Yen Thang	(35)	(34)	(32)	NA	40
Thanh Hoa	Vinh Thanh & Vinh Loc	NA	NA	NA	NA	45
	Dinh Tuong	NA	NA	NA	NA	35
	Van Ha	NA	NA	15	NA	18
	Van Thang	NA	NA	NA	NA	51

Source: P-CERWASSs. The figures in () shows the data in the ex-post evaluation report by the Ministry of Foreign Affairs (Original data is from P-CERWASSs).

3.3.2 Qualitative Effects

3.3.2.1 Water Quality

Water quality is monitored by P-CERWASSs in Ninh Binh and Thanh Hoa while it is monitored by the Preventive Medicine Department in Thai Nguyen. Table 10 shows the national standards of some quality parameters and the monitoring results of water quality. The quality of treated water at the water plant fulfills the national standards in respect of these important parameters. However, attention is to be paid to the following two issues.

(1) High amount of Manganese in water in Van Ha and Dinh Tuong

Table 10 illustrates that the Manganese parameter did not fulfill the 2007 standards (less than 0.5mg/L) in 2008 and 2009 in Van Ha and Dinh Tuong. In addition, the parameter remained high (Van Ha: 1.4mg/L, Dinh Tuong: 0.9mg/L) in 2010, although the parameter was removed from the 2009 national standards. The increase of contained amount of Manganese was caused by the change of the raw water quality.

(2) The hardness of water in all the communes except Yen Thang

As Table 10 shows, hardness of water (CaCO₃) fulfills the national standards (less than 350mg/L in QCVN02/2009-BYT, less than 300mg/L in QCVN01) in all the communes.

However, the hardness of water is beyond 10-100 mg/L, which is generally perceived to be good in taste, in eight out of twelve communes.

Table 10 Monitoring Results of Quality of Treated Water at the Project Facility

(Unit: mg/L except pH)

Province	Commune	Parameters	2005 Standard (Note1)	2007	2008	2009	2009 Standard (Note2)	2010
Thai Nguyen	Hoa Thuong*	pH	6.8-8.5	7.0	7.0	7.3	6.8-8.5	7.6
		Iron	< 0.5	0.03	0.05	0.03	< 0.5	0.05
		Manganese	< 0.5	0.024	kph	<0.02	NA	NA
		Arsenic	< 0.05	NA	NA	NA	< 0.05	0.001
		CaCO ₃	NA	NA	NA	NA	< 350	276
	Dong Bam*	pH	6.8-8.5	7.0	7.0	7.1	6.8-8.5	7.3
		Iron	< 0.5	0.018	0.06	0.02	< 0.5	0.04
		Manganese	< 0.5	0.024	kph	<0.02	NA	NA
		Arsenic	< 0.05	NA	NA	NA	< 0.05	0.001
		CaCO ₃	NA	NA	NA	NA	< 350	244
	Thinh Duc	pH	6.8-8.5	7.0	7.0	7.4	6.8-8.5	7.3
		Iron	< 0.5	0.003	0.12	0.22	< 0.5	0.05
		Manganese	< 0.5	0.07	kph	0.18	NA	NA
		Arsenic	< 0.05	NA	NA	NA	< 0.05	0.001
		CaCO ₃	NA	NA	NA	NA	< 350	108-112
	Nam Tien*	pH	6.8-8.5	7.0	7.0	7.2	6.8-8.5	7.4
		Iron	< 0.5	0.03	0.06	0.11	< 0.5	0.06
		Manganese	< 0.5	0.024	kph	<0.02	NA	NA
		Arsenic	< 0.05	NA	NA	NA	< 0.05	0.001
		CaCO ₃	NA	NA	NA	NA	< 350	146
Ninh Binh	Dong Phong	pH	6.8-8.5	7.9	7.5	7.7	6.8-8.5	6.9
		Iron	< 0.5	0.1	0	0.05	< 0.5	0.09
		Manganese	< 0.5	0	0	0.35	NA	NA
		Arsenic	< 0.05	NA	NA	NA	< 0.05	0.0015
		CaCO ₃	NA	NA	NA	NA	< 350	121
	Quang Son	pH	6.8-8.5	8.0	7.7	7.0	6.8-8.5	6.2
		Iron	< 0.5	0	0	0	< 0.5	0.05
		Manganese	< 0.5	0	0	0.3	NA	NA
		Arsenic	< 0.05	NA	NA	NA	< 0.05	0.0014
		CaCO ₃	NA	NA	NA	NA	< 350	79
	Yen Thang	pH	6.8-8.5	8.0	7.5	7.3	6.8-8.5	6.2
		Iron	< 0.5	0	0	0	< 0.5	0
		Manganese	< 0.5	0	NA	0.15	NA	NA
		Arsenic	< 0.05	NA	NA	NA	< 0.05	0.001
		CaCO ₃	NA	NA	NA	NA	< 350	46
Thanh Hoa	Vinh Thanh & Vinh Loc*	pH	6.8-8.5	7.3	7.5	7.4	6.8-8.5	7.3
		Iron	< 0.5	0.1	0.1	0.05	< 0.5	0.02
		Manganese	< 0.5	0	0	0	NA	NA
		Arsenic	< 0.05	0	0	0	< 0.05	0
		CaCO ₃	NA	NA	NA	NA	< 300	150
	Dinh Tuong*	pH	6.8-8.5	7.6	7.5	7.5	6.8-8.5	7.5
		Iron	< 0.5	0.25	0.05	0.05	< 0.5	0.05
		Manganese	< 0.5	0.3	0.5	0.7	NA	0.9
		Arsenic	< 0.05	0	0	0	< 0.05	0
		CaCO ₃	NA	NA	NA	NA	< 350	80
	Van Ha*	pH	6.8-8.5	7.5	7.4	7.5	6.8-8.5	7.4
		Iron	< 0.5	0.25	0.05	0.05	< 0.5	0.1
		Manganese	< 0.5	1.0	2.6	0.5	NA	1.4
		Arsenic	< 0.05	0	0	0	< 0.05	0
		CaCO ₃	NA	NA	NA	NA	< 350	150
	Van Thang	pH	6.8-8.5	7.2	7.0	7.0	6.8-8.5	7.1
		Iron	< 0.5	0	0	0	< 0.5	0.1
		Manganese	< 0.5	0	0	0	NA	NA
		Arsenic	< 0.05	0	0	0	< 0.05	0
		CaCO ₃	NA	NA	NA	NA	< 350	80

Source: P-CERWASSs in Ninh Binh and Thanh Hoa, and Preventive Medicine Department in Thai Nguyen.

* shows the water plant with treatment facilities to remove Manganese and/or Iron.

Note 1: 09/2005/QD-BYT.

Note 2: QCVN01/2009-BYT is applied for the water plant of more than 1,000 m³/day capacity (Vinh Thanh& Vinh Loc only for this Project). QCVN02/2009-BYT is applied for that of less than 1,000 m³/day capacity.

<Customers' Perception about water quality>

According to the beneficiary survey, 12% respondents felt that the water quality is “very good”; 51% “good”; 37% “bad”; and 0% “very bad”. Nine out of ten beneficiaries in Yen Thang responded “very good” because the water quality is good and the contained amount of CaCO₃ is as little as 46 mg/ℓ. All the respondents who felt “bad” pointed out the hardness of water as a reason for the low quality of water.



House water meter face blurred with CaCO₃ in Quang Son, Ninh Binh



Water pot with CaCO₃ scale in Quang Son, Ninh Binh



Water pipes with Manganese in Van Ha, Thanh Hoa (DN40mm)

3.3.2.2 Effective utilization of the well-digging equipment

The drilling-machine, which was procured by this Project during the Term I, was fully utilized for digging wells for the Project during the Term I and II. The equipment was provided to the CERWASS in October 2004. Between the project completion in 2006 and the ex-post evaluation in 2011, the total number of wells which were dug with the above equipment was fifty (8.3 wells per year in average) as shown in Table 11. In particular, the drilling machine is used in the northern provinces such as Thanh Hoa, Thai Nguyen, Vinh Phuc, Hanoi, Bac Ninh, and Son La, particularly for the purpose of water supply in rural areas.

Table 11 Size and number of the dug wells by the supplied equipment by year

Year	Size and number of wells	Number by Year
2006	82m x4, 80m x1, 94m x1	6
2007	102m x 2, 80m x 1, 55m x 4,	7
2008	65m x 3, 80m x 1, 59m x 1, 85m x 2, 95m x 1	8
2009	60m x 2, 80m x 1, 59m x 5, 100m x 2	10
2010	59m x 2, 100m x 1, 80m x 5, 35m x 1, 69m x 1	10
2011	45m x 3, 70m x 2, 80m x 4	9
Total		50

Source: CERWASS Center for Material Delivery and Technology.

This project has somewhat achieved its objective, namely the stable supply of safe water (population served and its percentage against the total population, maximum/average water supply amount per day, etc), and the equipment provided by this Project has been fully utilized. However, there are some minor problems; a) some indicators are not up to the expectation in

some communes; b) non-revenue water ratio is high in general; and c) there is some room for improvement in water quality, therefore its effectiveness is fair.

3.4 Impact

3.4.1 Intended Impacts

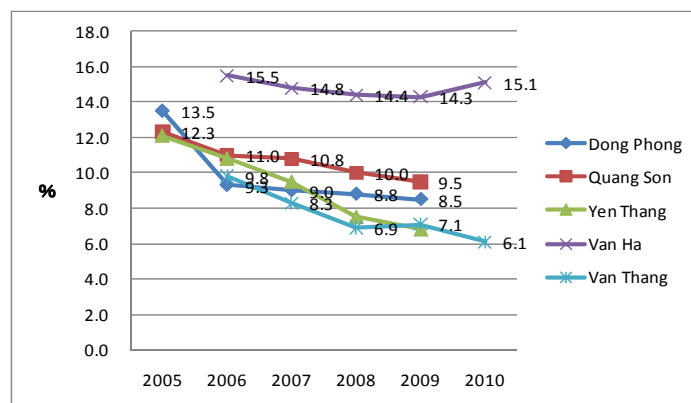
It could be concluded that the project has contributed effectively to the following two aspects directly as planned: a) the reduction in cases of water-borne diseases; and b) the reduction in time spent for fetching water.

3.4.1.1 Reduction in prevalence rate of water-borne diseases

Whereas the actual water-borne disease prevalence rate in the target area in 2001 was 39.5%¹⁰, it was planned to reduce the rate to 20% by 2005. Figure 3 shows the trend of the water-borne diseases prevalence rate in five communes out of twelve communes, where data is available. The figure illustrates the prevalence rate is decreasing trend. In the three communes in Ninh Binh Province and Van Ha Commune where the project was completed in July 2003, it was confirmed that the target was achieved by 2005. The target was also achieved in 2006 in Van Thang commune where the project was completed in January 2006. According to the health posts in each commune, the number of cases in dysentery, diarrhea, sore-eye, skin problems is decreasing in the past years.

The prevalence rate in Dinh Tuong and Vinh Thanh & Vinh Loc commune were not obtained, but it was confirmed that the number of cases in the above communes are declining between 2006 and 2010. The data in the four communes in Thai Nguyen, both prevalence rate and the number of cases, were not obtained.

¹⁰ The baseline figures in each commune were not found in the basic design report, thus exact comparison is not possible.



Source for the three communes in Ninh Binh Province between 2005 and 2007:

Project-level ex-post evaluation study for water sector, Ministry of Foreign Affairs (MoFA) of the Government of Japan, 2007

Source for others:

Calculated from the number of population and water-borne disease cases provided by health posts in each commune.

Note: In the above report by MoFA, the prevalence rate in Van Ha between 2005 and 2007 were 12.0, 11.0, 10.0 respectively. This evaluation used the prevalence rate, which was calculated based on the population and the number of cases provided by the health posts in each commune.

Figure 3 Prevalence rate of water-borne diseases in the five communes

Meanwhile, in order to raise the awareness of hygienic practices such as washing hands before eating and after using toilets, Information, Education and Communication (IEC) activities have been carried out in the project target areas by P-CERWASSs, Province Preventive Medicine Departments, local authorities and health posts in each commune, and international organizations such as UNICEF. The number of flush toilets is also increasing in the target areas in the past few years. Table 12 shows the possession rate of flush toilets in the target area before and after the project.

Table 12 Possession rate of flush toilets in the target areas

(unit: %)

Province	Before the Project	After the Project
Thai Nguyen	41.5	87.8
Ninh Binh	20.0	96.7
Thanh Hoa	62.5	80.0

Source: Beneficiary Survey (111 households)

Therefore, together with the IEC activities and the access to flush toilets, the supply of portable water by the project facility is considered to have contributed to reducing the prevalence rate of water-borne diseases.

3.4.1.2 Reduction in the number of households which require fetching water

At the time of planning in 2001, the ratio of households which require fetching water from

outside¹¹ was 100%. The target for 2005 was 18%. Although there is no baseline data for the time required for fetching water, one of the beneficiaries in Hoa Thuong mentioned that she had to fetch water four times a day and it took twenty to thirty minutes per one time. After the project completion, it was confirmed that no household is required for fetching water according to the beneficiary survey. Thus, it is concluded that the target was achieved. However, even after the project completion, many users still use self-owned wells in their compound. If we consider it as “water fetching labor”, the labor still exists.

As women were mainly responsible for water-fetching before the Project, it can be considered that women’s burden in fetching water was reduced by the implementation of this Project.

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

No major negative impact on the natural environment such as land subsidence has been observed.

3.4.2.2 Land Acquisition and Resettlement

There was no resettlement of residents. The land acquisition process went smoothly.

3.4.2.3 Water supply outside the target area

It was found that a few residents in Dong Phong Commune and Vinh Thanh Commune had moved their houses near the water plants after the project completion. It was confirmed that new houses have been built near the water plants. The water plant in Dinh Tuong Commune in Thanh Hoa Province supplies water in the neighboring town, Quang Lao Town, Ven Dinh District, in dry season. In 2009, a town hospital was constructed, but it was found that the water supply was not sufficient for the needs of the hospital. Upon the request by the District CPC and considering the urgent needs, the water supply for the District was commenced.

In light of the above, it could be noted that in addition to the anticipated impacts (i.e. reduction in the prevalence rate of water-borne diseases, labor saving in water-fetching), unexpected impact such as water supply to a hospital outside the target area was also confirmed. No particular negative effects were observed.

¹¹ This includes fetching water from shallow wells in their houses.



Beneficiary's House
in Thinh Duc South,
Thai Nguyen Province



New residential areas across
the water plant in Dong Phong,
Ninh Binh Province



Interview with the Health Post
in Van Ha, Thanh Hoa Province

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

Upon the project completion, each Commune People's Committee (CPC) is responsible for the overall management of the project facilities in Ninh Binh Province¹² and Thanh Hoa Province. In Thai Nguyen Province, P-CERWASS is responsible for the management, but each water plant can decide the water supply hours. As shown in Table 13, required number of staff is assigned in each water station. The staff in Thanh Hoa Province is responsible for both operation and water charge collection, which leads to the cost-efficiency.

Table 13 Number of staff in each water plant (Plan and Actual)

(unit: persons)

Province	Commune	Plan			Actual		
		Operators	Staff for charge collection	Total	Operators	Staff for charge collection	Total
Thai Nguyen	Hoa Thuong	6	4	10	6	4	10
	Dong Bam	6	3	9	5	2	7
	Thinh Duc North	4	2	6	3	1	4
	Thinh Duc South	(Note 1)			4	1	5
	Nam Tien	6	3	9	5	3	8
	Sub-total		22	12	34	23	11
Ninh Binh	Dong Phong	4	5	9	9	0 (Note 2)	9
	Quang Son	4	3	7	3	5	8
	Yen Thang	4	5	9	5	0 (Note 2)	5
	Sub-total	12	13	25	17	5	22

¹² Exceptionally, Ninh Binh P-CERWASS manages the water plant of Quang Son Commune after 2009. In 2009, 145 households in Village #6 and Village #7 of Quang Son Commune were transformed into Tam Diep Town. However, because it was predicted that the management such as water charge collection becomes complex, Ninh Binh P-CERWASS became to manage the water plant of Quang Son.

Thanh Hoa	Vinh Thanh & Vinh Loc	6	4	10	6+1 (Chief) Note 3	9
	Dinh Tuong	6	4	10	4	7
	Van Ha	6	7	13	8+1 (Chief)	3
	Van Thang	4	2	6	4	4
	Sub-total	22	17	39	23	23
Grand Total		56	42	98	79	79

Source: The figures for the plan are from the Basic Design Report (2001). The figures for actual are from the Questionnaire Answer (2011).

Note 1: 4 staff (2 staff x 2 shift) for the water plants without treatment facilities for iron and manganese and 6 staff (3 staff x 2 shift) for the water plants with treatment facilities.

Note 2: Village Heads collect charges in Dong Phong and Yen Thang.

Note 3: Staff in Thanh Hoa Province is responsible both for operation and water charge collection. In Dinh Tuong, water and electricity charges are collected together in each village.

3.5.2 Technical Aspects of Operation and Maintenance

Technical capacity for operation and maintenance can be considered to be satisfactory due to the following reasons:

- 1) the water plant was designed taking into account the technical level of the commune staff;
- 2) training has been provided by the Japanese consultants to the water plant staff between 2004 and 2005; and
- 3) when serious troubles which local operators cannot handle, plant managers of P-CERWASSs technically support their respective water plants.

Taking an example of Thai Nguyen Province, the number of staff who received training by this Project and who has been still working in the plants is summarized in Table 14. Approximately sixty percent of the original staff has still been working in the plants even five years after the training. The trained staff provides new staff with training by using the operation and maintenance manuals provided by this Project.

Table 14 the number of staff who received training by this Project and who has been still working in the plants in Thai Nguyen

(unit: persons)

Commune	Number	Remarks
Hoa Thuong	1 out of 4	
Dong Bam	3 out of 4	
Thinh Duc	5 out of 6	
Nam Tien	2 out of 4	1 staff was transferred to Hoa Thuong
Total	11 out of 18	12 out of 18

Source : Each water plant in Thai Nguyen Province

Regarding the well-drilling equipment provided by this Project, Japanese instructors provided local operators and technicians with on the job training (ten wells for 12 months in total)¹³.

¹³ Source: Data from JICA.

Although six out of ten trained staff left the Material Center, the remained four staff trained other eight staff. Thus, twelve staff can operate the machines¹⁴.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Cash Flow Status of each commune

Cash flow statement of each commune in 2010 is shown in Table 15.

Table 15 Cash Flow of each commune (Unit: million VND)

Province	Thai Nguyen				Ninh Binh			Thanh Hoa			
Commune	Hoa Thuong	Dong Bam	Thinh Duc	Nam Tien	Dong Phong	Quang Son	Yen Thang	Vinh Thanh & Vinh Loc	Dinh Tuong	Van Ha	Van Thang
Total Income	938	549	179	351	514	271	315	453.5	379.2	482.9	68.4
Total Expenses	774	476	443	435	514	271	315	433.7	184.7	440.8	100.6
Personnel	NA	NA	NA	NA	154	149	85.2	231.4	85.4	212.8	48.1
O&M (Note)	NA	NA	NA	NA	132	43	201.6	199.7	95.1	225.3	52.5
Other Expenses	NA	NA	NA	NA	228	78	28.2	2.6	4.2	2.7	0
Balance	164	73	-264	-84	0	0	0	19.8	194.5	42.1	-32.2

Source: P-CERWASSs

Note: O&M includes electricity, chemicals, parts and others.

In Thai Nguyen, there have been surpluses from operating activities in Hoa Thuong and Dong Bam for the past three years. Although Nam Tien experienced deficit in 2010, there was surplus in 2008 and 2009. On the other hand, the operating expenses of Thinh Duc exceeded revenues in the past three years. There are three reasons: 1) revenue from water charge is very small from the beginning due to the small scale facility with the production capacity of 350 m³/day; 2) both intake water and water amount have been decreasing since 2008 (average water amount per day is 190 m³/day); 3) staff should be assigned for the both facilities in North and South, which double the cost for salary. However, the Province People's Committee in Thai Nguyen has provided subsidies in the past three years. Thai Nguyen P-CERWASS provided costs for drilling one new well in Hoa Thuong because the water level of the existing wells went down and the demand for water has been increasing. However, the budget required for constructing new wells in other three communes has not been secured.

According to the P-CERWASS in Ninh Binh, the target communes are trying to keep balance by reducing the salary per person. In Quang Son and Dong Phong, the cost for the replacement of broken pumps, unreadable water meters by CaCO₃ and parts of control panels were borne mainly by communes. However, the budget required for repairing the well, for replacing 240 water meters (30% of the total households) in Yen Thang and for supplying water for two new

¹⁴ Source: CERWASS Material Center.

villages¹⁵ has not been secured.

In Thanh Hoa except Van Thang, there have been surpluses from operating activities for the past two-three years. On the other hand, the operating expenses of Van Thang exceeded revenues in the past three years. There are two reasons: 1) as same as Think Duc, revenue from water charge is very small from the beginning due to the small scale facility with the production capacity of 320 m³/day; and 2) revenues from water charge are not increasing as expected because the population served (82.5 percent of the plan in 2010) and average water supply amount (167 m³/day in 2010) are not growing as planned. However, Thanh Hoa P-CERWASS has provided subsidies in the past three years. Moreover, P-CERWASS covered the cost for the replacement of pumps in Van Ha and Dinh Tuong. On the other hand, the cost of the facility for removing manganese in Van Ha is estimated as two hundred million VND (approximately ten million JPY). This budget has not been secured yet.

In light of the above, there is no major problem with the daily operation cost because the Province People’s Committee and P-CERWASS have provided subsidies as necessary. It is also expected that the financial status will recover if non-revenue water is reduced in the future. On the other hand, some communes manage the cost for the replacement of broken pumps, unreadable water meters and parts of control panels, but others do not. The budget required for the facility for removing manganese and for installing new pumps and pipes has not been secured. P-CERWASSs are currently considering applying for the Grant Assistance for Grassroots Human Security Projects.

The water tariff of each commune is shown in Table 16.

Table 16 Water Tariff of each commune

(unit: VND/ m ³)						
Province	Commune	Households	Government Offices	Public facilities (Note)	Factories	Commerce/Services
Thai Nguyen	All communes	4,800	6,500	6,400	6,500	8,000
Ninh Binh	Dong Phong	3,800- 4,500	5,000	NA	5,000	5,000
	Quang Son	4,000	4,000	NA	4,000	4,000
	Yen Thang	3,500	3,500	NA	7,000	3,500
Thanh Hoa	All communes	3,000	5,000	5,000	5,000	6,000

Source: P-CERWASSs

Note: Parks, hospitals, schools, etc.

These tariffs are considered to be justifiable due to the following reasons: 1)water tariff in each commune has been revised properly along with the revision of electricity tariff (previous

¹⁵ There are approximately 186 households. Currently, the residents in the two villages use rain water.

revision was made in 2010 in all the communes); 2) the above tariffs are more or less the same as the national average of 3,500VND/ m³ in 2009 except Thai Nguyen; 3) income-expenses balance are kept in most of the communes except the communes where the number of the population served and the water production design capacity is extremely small; and 4) more than half of the respondents in the beneficiary survey feel that the tariff is reasonable in all the provinces as shown in Table 17; and 5) water charge collection rate is 100% in all the communes.

Table 17 Customer's Perception about the water tariff

Province	Expensive	Reasonable	Cheap
Thai Nguyen	39.0	56.1	4.9
Ninh Binh	13.3	88.3	2.3
Thanh Hoa	12.5	65.0	22.5

Source: Beneficiary Survey (111households)

According to the beneficiary survey, 22.5 % of the consumers in Thanh Hoa Province felt that the water tariff was cheap whereas 12.5% felt expensive. On the other hand, 39% consumers in Thai Nguyen felt expensive whereas only 4.9% felt cheap. Similarly, in Ninh Binh Province, 13.3% consumers in Thai Nguyen felt expensive whereas 2.3% felt cheap. At the same time, as much as 88.3% of consumers in Ninh Binh felt reasonable. This result matches with the water tariff setting for (from 3,000VND/ m³ in Thanh Hoa, from 3,500VND/ m³ in Ninh Binh and 4,800VND/m³ in Thai Nguyen).

3.5.4 Current Status of Operation and Maintenance (O&M)

The O&M status is good considering that five to eight years have already passed since the project completion. In all the target areas, P-CERWASS and communes made the best self-efforts both financially and technically. However, the following issues have not been settled particularly due to the financial and technical constraints.

(1) Declining of water level of intake wells and reduction of intake water in the three communes in Thai Nguyen Province

Since 2008, water level of intake wells was declined in Nam Tien and Hoa Thuong in dry season and in Thinh Duc South throughout the year. As a result, intake water and water supply is insufficient. Although clear cause-effect relationship has not been clarified through a study, one of the reasons could be the rapid urbanization and industrialization in the suburbs of Thai Nguyen City since 2008, according to the P-CERWASS. In 2009, P-CERWASS dug 70 meters-depth wells in Hoa Thuong, where demand for water has been rapidly increasing, with its own budget and started to supply water. However, budget for

digging new wells, well pumps, distribution pumps and distribution pipes for new wells in Think Duc South and Nam Tien has not been secured.

(2) Declining of water level of intake wells in Yen Thang and Dong Phong in Ninh Binh Province

Intake water from one of the three wells in Yen Thang started to decrease gradually, which brought inefficiency against the electricity charges. Although the reason is unknown, one of the reasons can be that routing of water sources were cut due to the heavy rain according to the P-CERWASS.

Because the dry season was longer than usual in 2010, the water level of the well became lower in Dong Phong. The position of the well pump was lowered from 25 meters to 42 meters below ground. Although the dry season in 2011 is not so serious as 2010, the water level of the well has not been back to the previous level. Because the position of the well pump was lowered, the existing 5.5 kw well pump cannot pump up water sufficiently. As there is only one well in Dong Phong, it is necessary to replace it with the one with higher capacity in order to secure water supply amount of 980 m³/day by one pump.

(3) Change of water quality of raw water in Van Ha and Ding Tuong in Thanh Hoa Province

The contained amount of Manganese in treated water in Van Ha and Ding Tuong is increasing compared with the time of project completion (See water quality in page 11). The parameter shows high value even after the treatment particularly in Van Ha (See picture in page 12). Because the service pipes are smaller than distribution pipes, it is difficult to remove the manganese inside the pipes. In order to remove the manganese the staff cleans the pipes twice a year. At the time of the inspection of the Term I, it was found that the increase in contained manganese was caused by the change of raw water quality. The Japanese consultants considered several options for counter-measures. In the aspect of regular operation and maintenance, it was suggested to limit 6L/day of Hypochlorite (HClO) for pre-treatment, not to inject HClO for post-treatment, and to back-wash the filtering ponds everyday. The above O&M counter-measures have been tried for one month as recommended by the Japanese consultant, but there was no positive change. Then, Thanh Hoa P-CERWASS undertook other operational measures in the O&M aspect, but the situation has not been improved to the satisfactory level. Thanh Hoa P-CERWASS is planning to remove manganese by installing an oxidization equipment, but the required budget has not been secured.

With regards to the regular operation and maintenance, the following issue needs attention.

O&M manuals are not handy at the water plants in Quang Son and Yen Thang (Ninh Binh Province), and Thinh Duc and Hoa Thuong (Thai Nguyen Province). The manuals have still been kept by the Chairpersons of the Commune People's Committees since the project completion.

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

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This Project is highly relevant to the country's development plan and development needs, both at the time of planning and at the time of ex-post evaluation. The Project was also in line with Japan's ODA policy at the time of planning. Hence, its relevance is high. The Development Study, which was conducted ahead of this Project, assisted this Project to narrow down the target area from 20 communes to 12 communes in light of needs and feasibility. Thus, the target area was properly selected. Efficiency is rated high since the expected output was obtained as planned within the planned project cost and period. This project has somewhat achieved its objective, namely the stable supply of safe water (population served and its percentage against the total population, maximum/average water supply amount per day, etc.), and the equipment provided by this Project has been fully utilized. However, there are some minor problems; 1) some indicators are not up to the expectation in some communes; 2) non-revenue water rate is high in general; and 3) there is some room for improvement in water quality, therefore its effectiveness is fair. Some problems have been observed in terms of financial aspects and current status of operation and maintenance, therefore, sustainability of the project is fair. In light of the above, this Project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- (1) In order to ensure proper O&M (technical sustainability)

In order to operate and maintain properly, it is recommended for the water plants of Quang Son, Yen Thang, Thinh Duc and Hoa Thuong to keep O&M manuals in practice, which were distributed to the Chairpersons of the Commune People's Committees upon the project completion, handy for daily use by placing them in operation rooms for easy reference.

- (2) In order to secure intake water and to remove manganese (effectiveness)

In order to secure sufficient intake water by constructing new wells in Nam Tien and

Thinh Duc South, Thai Nguen Province, and to ensure safe water by removing manganese in Van Ha, Thanh Hoa Province, it is recommended that those relevant communes and P-CERWASSs make efforts in securing required budget from different sources such as assistance from national and provincial governments, and Human Security Grassroots Grant by the Japanese government.

(3) In order to reduce Non Revenue Water (effectiveness and financial sustainability)

In order to reduce Non Revenue Water (NRW), it is recommended to strengthen countermeasures for water leaks by replacing obsolete water pipes and defective water meters and to promote preventive measures for water steeling. It is recommended that N-CERWASS/P-CERWASSs discuss the possibility of training for reducing NRW for the operators in the target areas in cooperation with Hanoi Water Supply Center under the Ministry of Construction, Ninh Binh College and JICA. During the training, it is recommended to invite the engineer from Quang Son, which made remarkable effects in reducing NRW and to share his experiences by demonstrating specific examples. Additionally, in order for water plant staff to continuously practice what they have learned at the training, it is recommended for plant managers of each P-CERWASS to participate in the training and to provide technical support after the training.

4.2.2 Recommendations to JICA

(1) Assistance for securing intake water and removing Manganese properly (effectiveness)

In case that executing agencies apply for the Grant Assistance for Grassroots Human Security Projects, it is recommended for JICA to provide sufficient information regarding the implementation results of this Project and operation and maintenance situations in the target areas and to provide indirect support.

(2) Assistance for implementing training for reducing NRW (effectiveness and financial sustainability)

In case that executing agencies plan to conduct training, it is one of ideas that JICA clarifies the cost-sharing between JICA and executing agencies and provides technical and financial support when necessary.

4.3 Lessons Learned

<Indicator setting>

In the ex-ante evaluation summary of this Project, operational indicators and qualitative indicators were not included. In future similar projects, in order to evaluate more comprehensively, it is recommended that operational indicators such as maximum/average

water production amount and maximum/average facility utilization rate as well as qualitative indicators such as water quality standards be included.

In addition, although effect indicators such as population served and its percentage were included, the target was set only at the provincial level, not at the commune level. The baseline and targeted prevalence rate of water-borne diseases was set, but only the average of all the communes was indicated. It is recommended that target figure and target year be set by commune in order to evaluate taking account of different timing of project completion and different situations by communes.

India

Ex-post Evaluation of Japanese Grant Aid Project
“The Project for Construction of Diarrheal Research and Control Centre”

External Evaluator: Tomoko Murayama, Global Link Management

0. Summary

This Grant Aid Project constructed a diarrheal disease research and control centre and provided necessary equipment to the National Institute of Cholera and Enteric Diseases (hereinafter referred to as NICED) in accordance with the activities planned in the Japanese Technical Cooperation Project for Prevention of Diarrheal Diseases (hereinafter referred to as the Phase II Project).

This Project has been highly relevant to the country’s development plan and development needs both at the time of planning and at the time of the ex-post evaluation as well as Japan’s ODA policy at the time of planning. Expected outputs (facility construction and equipment provision) were obtained mostly as planned with proper inputs, which led positive effects. Synergetic effects with the Phase II Project were observed as positive impacts. In general, the facility and most of the equipment have been utilized with proper operation and maintenance. In light of the above, this Project is evaluated to be highly satisfactory.

1. Project Description



Project Location



National Institute of Cholera and Enteric Diseases (NICED)

1.1 Background

Infant Mortality Rate (hereinafter referred to as IMR) in India is higher than other Asian countries and acute diarrheal disease has been one of the leading causes. Much of this relates to lack of proper methods for prevention, diagnosis, and treatment of diarrhoeal diseases. At the same time, newly emerging diarrheal diseases such as drug resistant dysentery and new types of cholera strains (O139, hybrid variants) were identified in the country during 1990s and thus

appropriate countermeasures were urgently required.

Under these circumstances, the Government of India requested the Government of Japan for the Technical Cooperation with the aim of strengthening capabilities for prevention and control of diarrheal diseases at NICED, including human resource development for molecular biology/epidemiology, improving research facilities and promoting collaborative research. NICED is one of the premier institutes of the Indian Council Medical Research¹ (hereinafter referred to as ICMR) conducting research and training on diarrheal diseases as the main national center. In response to the above request, Japan International Cooperation Agency (hereinafter referred to as JICA) implemented the Technical Cooperation Project for Prevention of Emerging Diarrheal Diseases (hereinafter referred to as the Phase I Project) in NICED as a five year project from 1998 to 2003. While remarkable progress of diagnostic techniques at the molecular level was seen for bacterial diarrheal diseases in the Phase I Project, next challenge, which was how NICED could contribute to reduce mortality from diarrheal diseases and benefit people, was clarified.

After the Phase I Project, the Phase II Project was implemented from 2003 to 2008 in order to strengthen diagnostic and treatment skills at the molecular level on viral and parasitological diarrheal diseases and to disseminate the advanced technology throughout India. At the same time, it was identified that the existing facility and equipment were not adequate to implement the Phase II Project effectively. Therefore, the Government of India requested the Government of Japan for the Grant in Aid Project.

1.2 Project Outline

The objective of the Grant-in-aid Project is to strengthen capabilities for prevention and control of diarrheal diseases at NICED in Kolkata City, West Bengal State, by creating a diarrheal diseases research and control centre, an incinerator, a sewage plant, and providing necessary equipment in accordance with the activities planned in the Phase II Project.

¹ The Indian Council of Medical Research (ICMR) is the apex body in India for promoting biomedical research. There are 30 research institutes/centers/units under ICMR and NICED is one of the centers.

Table 1 Project Outline

Grant Limit/ Actual Grant Amount	2,134 million yen / 2,116 million yen
Exchange of Notes Date	June, 2004
Implementing Agency	Indian Council of Medical Research (ICMR) and National Institute of Cholera and Enteric Diseases (NICED)
Project Completion Date	March, 2006
Main Contractors	Sumitomo Mitsui Construction Co., LTD (Construction) Mitsubishi Corporation Co., LTD (Equipment) Ogawa Seiki Co., LTD (Equipment)
Main Consultant	Nihon Sekkei Co., LTD.
Basic Design	From November, 2003 to May, 2004
Detailed Design	From June, 2004 to September, 2004
Related Projects	<p>(1) Japanese Technical Cooperation for the Project for Prevention of Emerging Diarrheal Diseases (February, 1998- January, 2003) Project Purpose: Technology will be developed and established for emerging diarrheal diseases at the NICED. Project Outputs: 1)Effective identification of enteric pathogens is developed up to molecular level, 2)Newer therapeutic approaches are developed for emerging diarrheal diseases, 3)Serum bank concerning diarrheal diseases is established, 4)Drug resistance on enteropathogenic organisms can be monitored effectively, 5)Referral library for the strains and diagnostic serum of enteropathogens is established, 6)Etiologic monitoring of diarrheal pathogens is conducted in human and reservoir, 7)Network of relevant hospitals is improved.</p> <p>(2) Japanese Technical Cooperation for the Project for Prevention of Diarrheal Diseases (Phase II) (July, 2003- June, 2008) Project Purpose: Strengthen capacities and augment capabilities at NICED and to disseminate the same throughout the country for prevention and control of diarrheal diseases Project Outputs: 1)Capacity to identify diarrheal diseases at the molecular level is established, 2)Strains and diagnostic sera are appropriately managed and archived, 3)Constant surveillance of pathogens of diarrheal diseases is established, 4)Technical expertise to identify diarrheal pathogens is transferred to other parts of India and neighboring countries, 5)Surveillance network of diarrheal diseases is established in India, 6)The capacity to investigate the efficacy of drugs for diarrheal diseases is improved.</p>

Source: The Joint Final Evaluation Report on the Phase I Project and Phase II Project

2. Outline of the Evaluation Study

2.1 External Evaluator

Tomoko Murayama, Global Link Management Inc.

2.2 Duration of the Evaluation Study

Duration of the Study: December, 2010 - November, 2011

Duration of the Field Study: 23rd March, 2011 – 3rd April, 2011

5th June, 2011 – 13th June, 2011

2.3 Constraints during the Evaluation Study

No particular constraint was identified.

3. Results of the Evaluation (Overall Rating: A²)

3.1 Relevance (Rating: ③³)

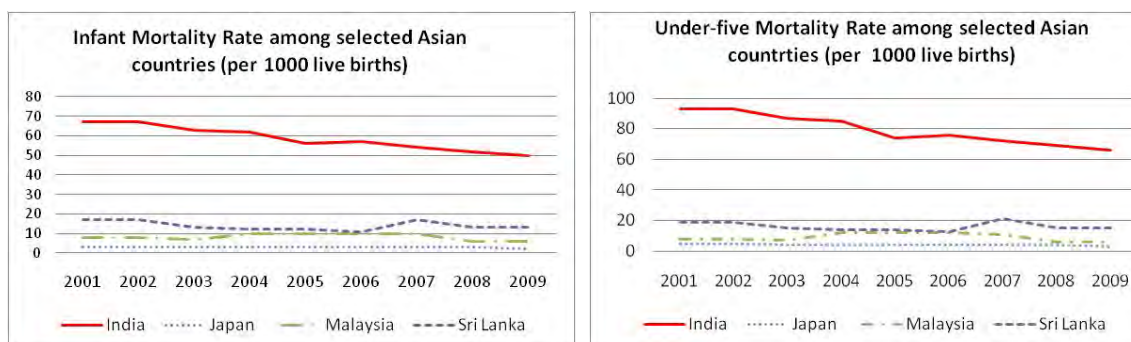
3.1.1 Relevance with the Development Plan of India

At the time of planning, National Health Policy 2002 was adopted as the latest national health policy in the country. The high morbidity and mortality from common water-borne diseases, such as gastroenteritis, cholera, hepatitis A and hepatitis E, were found to be concerns and thereby the Ministry of Health and Family Welfare set up a goal by 2010 to reduce mortality from infectious diseases by 50%. At the same time, the importance of developing therapeutic drugs/vaccines and diagnostic tools for neglected diseases were also emphasized in the policy. Establishing an efficient disease surveillance network for common communicable diseases such as cholera was also recognized as crucial to provide prompt and cost-effective health care service.

At the time of the ex-post evaluation, the latest national health policy was the Eleventh Five Year Plan (2007-2012), which followed the same track with the National Health Policy 2002. Reduction of IMR from 58 to 28 per 1,000 live birth was one of the time-bound goals by 2012 and acute diarrheal disease was one of the target diseases for reduction of IMR. In the policy, the research area dealt under this Grant Aid Project and the Phase II Project was recognized as an essential area in order to improve the nation's health in long term.

3.1.2 Relevance with the Development Needs of India

As shown in Figure 1, IMR and Under-five mortality rate in the country have been continuously higher than other Asian countries and as shown in Figure 2, acute diarrheal disease has been one of the leading causes.

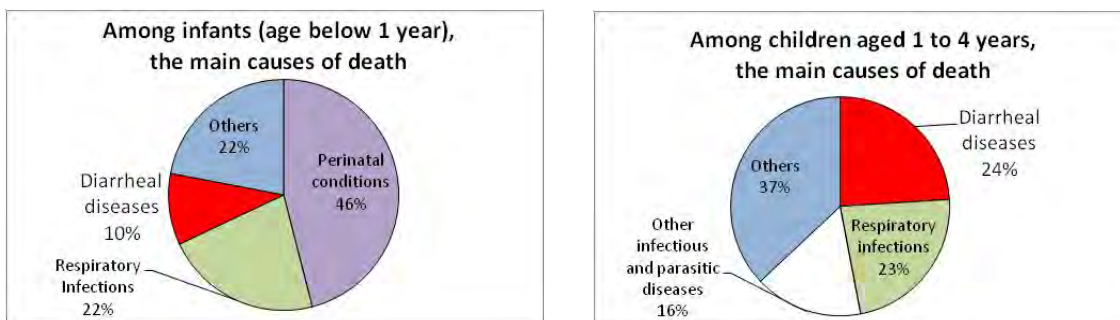


Source: The state of the world's children 2003-2011, UNICEF

Figure 1 IMR and Under-Five year mortality rate in India and several Asian countries (2001-2009)

2 A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

3 ③: High, ②: Fair, ① Low



Source: Report on causes of death in India 2001-2003, Ministry of Home Affairs, India

Figure 2 Main causes of death among infants and children aged 1 to 4 years old in India

The national policies at the time of planning and also at the time of ex-post evaluation noted the necessity of better understanding on the molecular and biological mechanisms underlying diarrheal diseases, developing new vaccines, diagnostic tools, and cost effective therapies, and establishing a series of surveillance network as a public health instrument for timely intervention in order to improve IMR and Under-five mortality rate. Hence, the project purpose is in alignment with development needs of India.

3.1.3 Relevance with Japan's ODA policy

Economic cooperation towards India has targeted following four areas since May 2003: healthcare, agricultural and rural development, environmental conservation, and economic infrastructures.

At the time of planning, priority areas in Japan's ODA policy towards India (2001) were as follows: environmental conservation, economic reform assistance, and poverty reduction. Infectious disease prevention and control program is under the poverty reduction area.

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

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

As shown in Table 2, most outputs were accomplished as planned. The layout was slightly changed from the plan after close discussion in order to improve usability. Therefore the change was appropriate. All 121 types of equipment except DNA Array System⁴ were properly provided from Japan. The DNA Array System could not be utilized in NICED since the type purchased was not for microorganisms as planned but for mouse. The reason for listing for

⁴ DNA Array System: Equipment which allocated a collection of microscopic DNA spots to a solid surface in order to analyze expression level of a particular gene in a cell.

bidding by error was that when draft was made by Japan side and finalized by NICED, there was no system to get it checked by end-users, such as researchers, in NICED and thereby it was passed unnoticed.

Table 2 Output (planned and actual)

Items	Planned ¹	Actual ²
Construction		
1. A research center	Reinforced concrete, Four-story building with 6,652m ²	As Planned
2. A generator room	Flat building 61m ²	As Planned
3. A sewage treatment plant	Flat building 23m ²	As planned
4. An incinerator plant	Flat building 70m ²	As planned
Procurement of equipment		
	Atomic Force Microscope, Inverted Fluorescence Phase Contrast Microscope, Scanning Electron Microscope, Multi Angle Laser Light Scattering, Automated Proteomics Workstation with LC/MS/MS, Spectrofluorometer, FTIR Spectrophotometer, etc.	As planned except a DNA Array System

Source: 1. The Basic Design Study Report (2004)
2. NICED

The Project outputs from India side, which had been planned to complete before starting construction by Japan side, was implemented on time, including legal acquisition of the construction sites, provision of temporary sites, and other necessary arrangement. The land for the research center was purchased from the Government of West Bengal and sites for the incinerator and the sewage treatment plant were donated from the Government of West Bengal.



Incinerator



Sewage treatment plant

3.2.2 Project Input

3.2.2.1 Project Cost

The total Project cost was almost within the planned budget (99.8%). As shown in Table 3, actual funds spent by the Government of Japan was lower than the ceiling amount at the ex-ante,

while the actual spent as counterpart funds from the Government of India was higher than it was originally planned. It is because the charges to obtain no objection certificate from the West Bengal Fire Service, foreign bank charges, and authorization to pay were not included in the estimation and hence the increase was necessary.

Table 3 Project Cost (Planned and Actual)

(Unit : Million yen)

	Planned Cost ^{*1}	Actual Cost	Ratio (%)
The Government of Japan	2,134	2,116 ^{*2}	99.2
The Government of India	22	36 ^{*3}	163.6
Total	2,156	2,152	99.8

Source: 1. The Basic Design Study Report (2004)
 2. Data from JICA
 3. NICED

3.2.2.2 Project Period

The Project period was 22 months from June 2004 to March 2006 as planned.

Both project cost and project period were mostly as planned, therefore efficiency of the project is high.

3.3 Effectiveness (Rating: ③)

3.3.1 Quantitative Effects

The following four indicators were set up at the time of planning without any numeric target levels. Although it is difficult to objectively measure degree of achievements without any target level, upward trends were observed in the all indicators.

(1) Number of diarrheal diseases diagnosed at the molecular level in NICED

As shown in Table 4, the number of diarrheal diseases diagnosed at the molecular level has continued to rise since 2002. During the Phase I Project, diagnostic methods at the molecular level were introduced mainly for bacterial diarrheal diseases. Later, the Phase II Project strengthened diagnostic methods for parasitological diarrheal diseases and viral diarrheal diseases with the equipment provided by this Grant Aid.

Table 4 Number of diarrheal diseases diagnosed at the molecular level in NICED (Planned and Actual)

	Baseline (2002)	Planned (2010)	Actual (2010)
Number of diarrheal diseases diagnosed at the molecular level in NICED	938	Increase	1,696

Source: NICED

(2) Number of NICED staff who obtained molecular biological diagnostic skills

As shown in Table 5, the number of NICED researchers who obtained skills to diagnose diarrheal diseases at the molecular level using PCR⁵ provided by this Grant Aid Project and technical assistance through the Phase II Project was increased.

Table 5 Number of NICED researchers who obtained molecular biological diagnostic method (Planned and Actual)

(Unit: people/year)

	Division	Baseline (2002)	Planned (2010)	Actual (2010)
Number of NICED researchers who obtained skills to diagnose diarrheal diseases at the molecular level)	Bacteriology	1	Increase	25
	Biochemistry	1	Increase	2
	Clinical Medicine	1	Increase	9
	Immunology	1	Increase	2
	Parasitology	1	Increase	10
	Pathophysiology	1	Increase	3
	Virology	1	Increase	15

Source: NICED

Note: Diagnosis at the molecular level was defined as being able to use PCR for diarrheal disease diagnosis.

(3) Number of diagnostic sera stored and Number of strains stored

As shown in Table 6, NICED did not have appropriate environment to produce and store diagnostic sera and strains at the time of planning. Type and amount of diagnostic sera were dramatically increased with high quality of animal house provided by this Grant Aid Project and obtained techniques to produce monoclonal antibody, which enabled NICED to increase and store 105 types of diagnostic sera. Accordingly, NICED has started to provide the diagnostic sera freely to other research and health institutions according to their request.

Table 6 Number of diagnostic sera stored and number of strains stored (Planned and Actual)

	Baseline (2002)	Planned (2010)	Actual (2010)
Number of diagnostic sera stored (specimen)	0	Increase	105
Number of strains stored (strain)	0	Increase	821

Source: NICED

(4) Number of identifiable pathogens in NICED

By utilizing the facility and the equipment provided by this Grant Aid Project and technical assistance through the Phase II Project, identifiable species were increased from four or five at the time of planning to twenty five with which the total isolation rate rose

⁵ PCR enables researchers to generate millions of copies of a particular DNA sequence from a small amount of desired DNA.

from 20% to 70%.

3.3.2 Qualitative Effects

3.3.2.1 Utilization Status of the Facilities and Equipment provided

The newly constructed building in this Grant Aid Project has functioned as a main center in NICED⁶. Utilization status of the equipment provided by this Project is fairly good except one machinery. There are two successful factors to achieve high utilization status : 1) NICED staff, JICA experts of the Phase II Project and Japanese consultants of this Project closely discussed research topics, types, specs, amount, and necessary maintenance in order to develop the equipment list and 2) the Phase II Project provided technical assistance on utilization of the equipment and maintenance.

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

3.4 Impact

3.4.1 Intended Impacts

3.4.1.1 Total number of networked institutions for surveillance network

As shown in Table 7, the total number of networked institutions for surveillance remained the same. This is because necessary manpower, equipment and computers were not allocated in target health institutions although this Grant Aid Project provided a surveillance network room, server and computers to NICED and relevant trainings for target health institutions were done by NICED during the Phase II Project period.

Under these circumstances, NICED has continuously conducted training for the target institutions in cooperation with Okayama University⁷. Also, NICED has submitted the application “Multi-Center National Diarrhea Surveillance⁸” to ICMR in order to obtain necessary budget for providing manpower, equipment and computers to target institutions. ICMR is most likely to approve the application, and hence the number of networked institutions is expected to increase from two to ten in the near future.

6 At the time of the ex-post evaluation, NICED has three buildings. The oldest building is under renovation.

7 Okayama University, Japan has established a Collaborative Research Center of Okayama University for Infectious Diseases (COUID) in NICED since 2005 and has engaged in research on emerging and reemerging infectious diseases.

8 Multi-Center National Diarrhea Surveillance aims to monitor changes in disease patterns including drug sensitivity, to provide a data base on diarrheal diseases for researchers, to provide regular reports to the State Governments and other relevant agencies on diarrhea pathogens, to develop an early warning system for forecasting an epidemic and to improve care and introduce better preventive measures.

Table 7 Number of networked institutions for surveillance network (Planned and Actual)

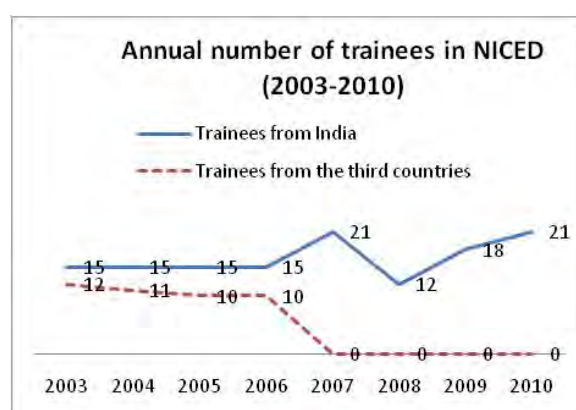
	Baseline (2002)	Planned (2010)	Actual (2010)
Total number of networked institutions for surveillance network	2	Increase	Remained the same

Source: NICED

3.4.1.2 Total number of Indian and oversea trainees

As shown in Figure 3, NICED has continuously conducted trainings on diagnostic method at the molecular level for Indian researchers. Annually from 12 to 21 Indian researchers take the course.

Although some researchers from other countries⁹ also received the training every year during the Phase II Project, no training was arranged from 2007 to 2010 after the Phase II Project. The training on food borne diseases, however, was conducted for 30 researchers in year 2011 at NICED, which training programme was financially supported by World Health Organization (hereinafter referred to as WHO).



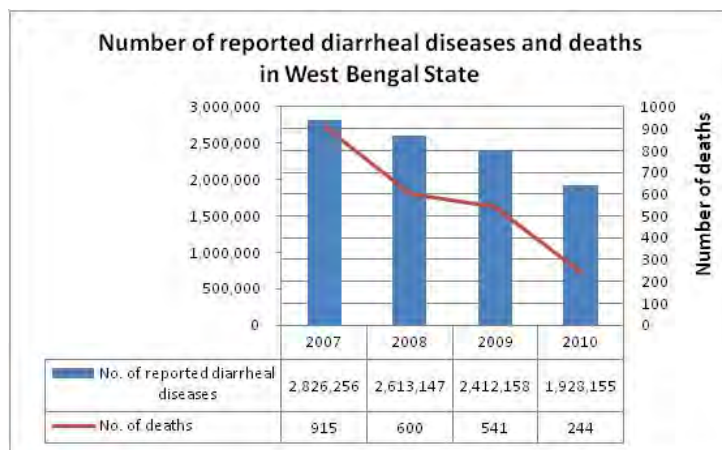
Source: 1. Data from 2003 to 2008: The joint final evaluation report of the Phase II Project
2. Data from 2009 to 2010: NICED

Figure 3 Annual number of trainees at NICED (2003-2010)

3.4.1.3 Reduction of mortality from diarrheal diseases in the State of West Bengal

As shown in Figure 4, both the number of reported cases and the number of the death from diarrheal diseases have declined steadily in the State of West Bengal. The fatality rate fell from 0.03% to 0.01% from 2007 to 2010.

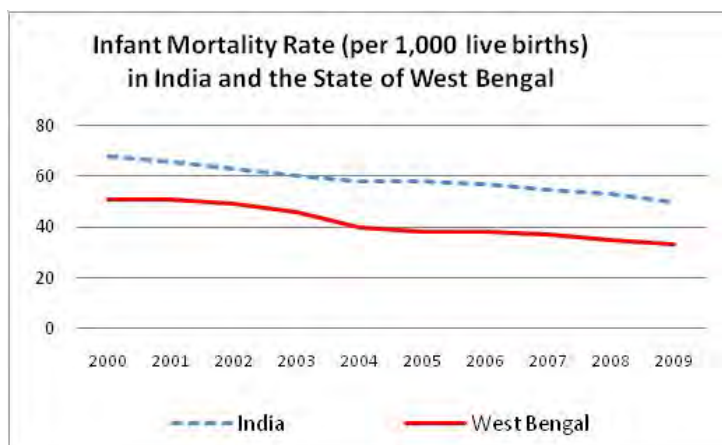
⁹ Scientists from China, Bhutan, Myanmar, Nepal, Sri Lanka, Philippine, Indonesia, Bangladesh, Zambia, Keniya, Ghana, and Tanzania participated the trainings at NICED during the Phase II Project.



Source: Department of Health and Family Welfare, the Government of West Bengal

Figure 4 Annual No. of reported diarrheal and the deaths in the State of West Bengal (2007-2010)

As shown in Figure 5, the State of West Bengal has achieved 35% of reduction in IMR (from 51 to 33 per 1,000 live births) for past ten years, which was the second highest reduction throughout India.



Source: Department of Health and Family Welfare, the Government of West Bengal

Figure 5 Infant Mortality Rate in India and the State of West Bengal (2000-2009)

The Government of West Bengal recognizes that Japan's cooperation has contributed to control of diarrheal diseases in the State. It is because NICED acquired the ability to identify more pathogens with advanced facility and equipment provided by this Grant Aid Project and technical assistance through the Phase I and Phase II projects and thereby NICED enabled to provide higher technical assistance to the State.

More specifically, NICED has directly contributed to the reduction of morbidity and mortality from diarrheal diseases in the West Bengal State from following four aspects: 1) conducting investigation when outbreaks occurred and providing appropriate countermeasures against

identified pathogens, 2) providing trainings for health staff of the State to improve diagnostic skill, 3) sharing monthly/weekly surveillance reports from Infectious Disease Hospital and Dr. B.C. Roy Memorial Children's Hospital, and 4) providing updated information and technology for diarrheal diseases diagnosis.

In addition to the above mentioned contribution, patient work at communities by health workers is recognized as another key successful factor. Several channels were utilized by health workers in order to strengthen communities: 1)improving accessibility and safety of drinking water, 2)improving sanitation of latrines, 3)developing capacity of community health workers and health volunteer, 4)improving accessibility to Oral Rehydration Salts (ORS)¹⁰, and 5)disseminating Information Education and Communication (IEC)¹¹ activities for mothers, and so on.

3.4.1.4 Impacts on other States

During the Phase II Project, NICED conducted trainings on diagnostic skills at the molecular level with the equipment provided by this Grant Aid Project targeting about 230 health staff from 21 States out of 28 States throughout India.

The number of requests for technical assistance from the States to NICED has increased since the Phase II Project started. It is because more pathogens became identifiable through the trainings, and those trainings promoted active exchange of information between NICED staff and the training participants. The number of outbreaks and requests for identification of pathogens were 25 and 122 respectively from 2009 to 2011.

It is expected that expansion of the surveillance network promotes strengthening cooperation among States and NICED, and NICED is most likely to make contribution to reduction of the mortality from diarrheal diseases throughout India.

3.4.2 Other Impacts

3.4.2.1 Synergetic effect with Technical Cooperation Projects

The synergetic effects between this Grant Aid Project and the Phase II Project were observed as several positive impacts, which were underpinned by following three successful factors.

The first factor was the presence of an overall plan. The plan was made when this Grant Aid started in order to clarify role of each Project and the overall goal, which was set based on recommendation extracted from the Phase I Project. More specifically, this Grant Aid Project was recognized as the complementary project for the Phase II Project and the overall goal was

10 ORS is a simple, cost-effective treatment for diarrheal diseases to prevent dehydration.

11 IEC combines strategies, approaches and methods that enable people to play active roles in achieving protecting and sustaining their own health.

aimed at reducing diarrheal disease mortality in India.

The second factor was timely implementation. This Grant Aid Project had produced expected outputs on time, which enabled the Phase II Project to make the best use of the facility and equipment during the rest of the project period (two years and three months).

The third factor was presence of the strong relationship and trust among interested parties. The cooperation among the interested parties, such as ICMR, NICED, Japanese consultants of this Grant Aid Project, JICA experts of the Phase II Project, and JICA staff, was promoted actively with high recognition of the past Japanese cooperation in the health sector, achievements during the Phase I Project in NICED, and long term relations among NICED researchers and JICA experts.

3.4.2.2 Impacts on the natural environment

The incinerator meets the environmental criteria of India and its combustion temperature is over 800-1,000, which avoids dioxin emission. Chimney of the incinerator was set up higher than 30m, not only due to the environmental criteria but also giving sufficient consideration to neighboring buildings. Hence, no major problem was observed regarding the impact on environment.

Lab animal carcass is disposed in the incinerator while medical waste, such as disposable needles and gloves, and produced ash from the incinerator are disposed through a private agency.

Effluent treatment is done separately for sewage from research divisions and animal house and send to precipitation fractionation tank. Then, all sewage joins together in the main sewer and is released to outside. No major problem was observed regarding the impact on environment.

3.4.2.3 Land Acquisition and Resettlement

Land for the new research center was properly acquired from the Government of West Bengal. Land for the incinerator and the sewage was provided free of cost by the Government of West Bengal. There was no resettlement.

3.4.2.4 Activation of collaborative research

Collaborative works with foreign research centers and universities, including ones in Japan, have been fostered after this Grant Aid Project. NICED conducted the large scale field trials with the International Vaccine Institute¹² for oral cholera vaccine¹³ and high protection rate

12 The International Vaccine Institute conducts research for new vaccine development targeting dysentery, cholera, typhoid etc. founded by the Bill & Melinda Gates Foundation.

13 Oral Cholera Vaccine was developed in international vaccine institute and the technology was

(70%), safety, and herd immunity effect¹⁴ were scientifically confirmed. The series of JICA's cooperation contributed to equip the research center and to strengthen capacity of NICED staff to be able to conduct the trials. Although WHO pointed out that cholera vaccine is only an additional measure but not a substitute for all other measures, it is evaluated with high expectations that availability of an inexpensive, safe and effective vaccine in India will facilitate role of the vaccine to control re-emerging cholera which cause dehydration and symptom of shock and can kill people within hours.

As of June 2011, the vaccine is under prequalification process¹⁵ in WHO. Bangladesh and Zimbabwe have already started to study possibility of introducing the vaccine.



Oral Cholera Vaccine which efficacy, safety and herd immunity was confirmed by NICED



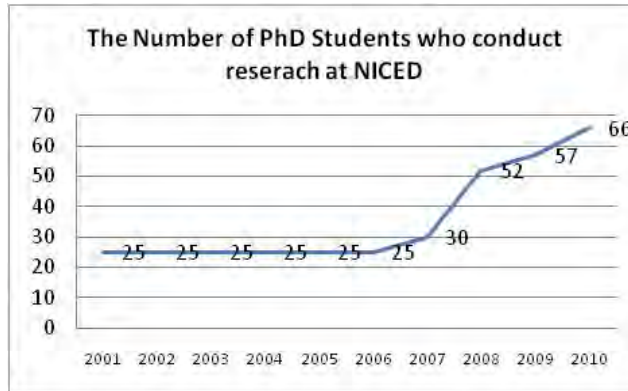
Ward for female diarrheal disease in-patients in ID hospital, the State of West Bengal

After completion of this Grant Aid Project in 2006, advanced facility and equipment have attracted PhD students and other foreign research organizations to conduct research at NICED. As shown in Figure 6, the number of PhD students who conduct research at NICED has clearly increased after 2006.

transferred to Indian pharmaceutical company. After several field trials, the Drug Controller General of India has licensed and being marketed in India. The Ministry of Health and Family Welfare has been recommended to first introduce it in a guided manner in cholera endemic areas of West Bengal and Orissa and expected to expand to other areas later.

14 Herd immunity is a form of immunity that occurs when vaccination of a significant portion of a population provides a measure of protection for individuals who have not taken vaccine.

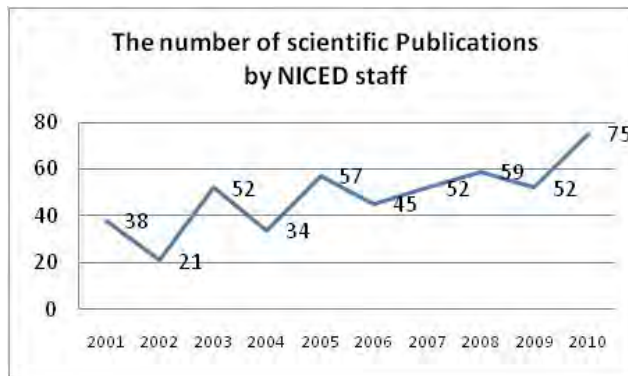
15 Once a vaccine is prequalified by WHO, the vaccine is recognized quality, safety, and efficiency meet international standard. The production country can export the vaccine to other countries. WHO categorizes diseases by four categories to prioritize the process and oral cholera vaccine is in the second highest category. As of June 2011, the only WHO-prequalified Oral Cholera Vaccine is the double dose Swedish vaccine called Dukoral. This vaccine is considered too costly (\$15 a dose) and difficult to administer for routine general use for children due to necessity of relatively large volume of buffer solution.



Source: NICED

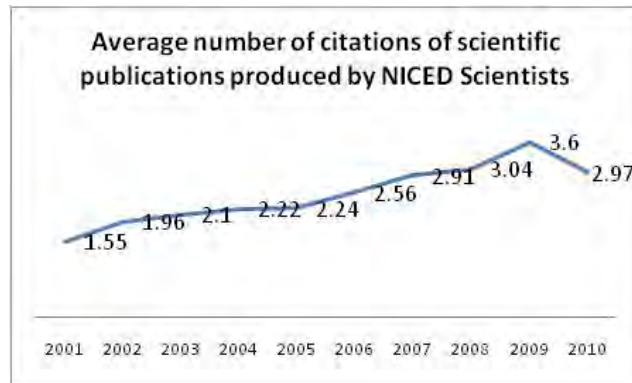
Figure 6 The number of PhD students who conduct research at NICED (2001-2010)

NICED’s scientists have published their research results in renowned academic journals such as Lancet, New England Journal of Medicine, Proceedings of the National Academy of Sciences of the USA, Journal of Biological Chemistry etc. NICED has gained global recognition as the main research centre in India for diarrheal diseases. As shown in Figure 7, the number of published papers has continued to rise. As shown in Figure 8, average number of citation has increased from 1.5 in 2001 and remained over 2.5 since 2007, which indicates improvement in the quality of papers. NICED recognizes that the series of JICA’s cooperation enabled NICED to conduct higher quality of research and produce higher quality of papers.



Source: NICED

Figure 7 The number of scientific publications by NICED staff (2001-2010)



Source: NICED

Figure 8 Average number of citation of the publication produced by NICED scientists (2001-2010)

3.4.2.5 International reputation of NICED

NICED has been accepted as a member of Pulse Net Asia-Pacific¹⁶ since 2005 as the first institution in the country as a result of strengthened diagnostic skill which reached the international level. NICED is also one of the reference centers of CHOLDInet¹⁷, which is the laboratory network on diarrheal diseases and cholera initiated by WHO from 2009.

3.4.2.6 Growing support to NICED by ICMR

ICMR has increased supports to NICED with the growing international reputation. For example, ICMR constructed a new building for NICED after starting this Grant Aid Project and installed latest equipment, such as fluorescence activated cell sorter¹⁸ with request from NICED. As described in 3.5 Sustainability, annual budget from ICMR to NICED has been increased almost three times compared with 2003, at the time of beginning this Grant Aid Project. ICMR also approved this year the creation of a Biorepository¹⁹ in NICED which will become a National Reference Centre for enteric pathogens.

¹⁶ PulseNet is an international network organized by Centers for Disease Control and Prevention (USA) in order to detect foodborne diseases, facilitate early identification of common source outbreaks, and assist epidemiologists in investigating outbreaks. PulseNet participants must be certified by stringent PulseNet standards and pass annual proficiency testing in order to maintain certification.

¹⁷ CHOLDInet is a web-based information system aiming to strengthen laboratory capacity for monitoring and rapid detection of cholera and other causes of diarrheal diseases to advance the application of control measures.

¹⁸ Fluorescence Activated Cell Sorter is a machine that can rapidly separate the cells in a suspension on the basis of size and the color of their fluorescence.

¹⁹ Biorepository is a repository that collects, processes, stores, and distributes biological specimens and associated information to support future scientific investigation.



New building constructed by ICMR



Fluorescence activated cell sorter
which was provided by ICMR

In summary, positive impacts such as activation of collaborative research and increasing international reputation were observed in addition to intended impacts (No. of networked institutions for surveillance network and No. of Indian and overseas trainees, Reduction of diarrheal disease cases and the mortality). No particular negative impact of the Project was observed.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

Maintenance of the building has been outsourced to a private company and hence it is clear where responsibility lies. The company has dispatched about 20 technical experts which is enough number of staff with appropriate level of skills to maintain the facility. Condition of the maintenance and schedule is supervised by a chief maintenance engineer of NICED.

3.5.2 Technical Aspects of Operation and Maintenance

Technical capability to handle operation and maintenance of the facility is satisfactory. The outsourcing company was engaged in this Project as a subcontractor and obtained proper skill for maintenance during the Project period. The chief maintenance engineer of NICED received relevant trainings for 70 days in Japan and no particular technical problems on supervision of maintenance was identified.

3.5.3 Financial Aspects of Operation and Maintenance

As shown in Table 8, budget allocation from ICMR to NICED has increased around 1.5 to 3 times from 2003 to 2009. All budget requested from NICED to ICMR have been approved every year and no major problems were identified in the balance of income and expenditure. After completion of this Grant Aid Project, many foreign research institutions, such as Center for Disease Control and Prevention, USA and University of Maryland, have shown interests in funding collaborative research with NICED, and proportion of extramural funds have been

continued to rise as shown in Table 9.

Meanwhile, maintenance cost of the new building became four times higher than expected cost at the time of planning. It was revealed at the time of investigation of detection that the State Government of West Bengal did not have a capacity to provide proper maintenance of water treatment system, regular replacement of high quality filter of AC system of animal house section etc, and regular maintenance of hot and cold room. Hence the building maintenance had to be outsourced to a capable and reliable mechanical company in order to maintain high standard of laboratory quality.

Table 8 Budget allocation from ICMR to NICED and expenditure (FY2003 - FY 2009)

(Unit: 1,000 Indian Rupee)

		2003	2006	2007	2008	2009
Total Budget from ICMR		92,848	223,424	141,785	333,292	267,177
Approximate expenditure	Human Resources	48,153	64,333	70,170	128,208	156,613
	Travel Expenses	1,020	1,450	1,450	41,236	
	Operational & Maintenance	16,470	44,000	41,367	77,745	42,610
	Publication	N/A	10,950	4,500	5,186	N/A
	Equipment	11,103	22,529	8,430	80,572	64,461
Capital (Budget – Expenditure)		16,102	80,162	15,868	345	3,493

Source: NICED

Note: Not available (N/A) due to change of categorization at financial management office, NICED

Table 9 Approximate total amount of extramural funds from foreign research institutes and foundations

(Unit: 1,000 Indian Rupee)

	2003	2006	2007	2008	2009
Extramural funds	N/A	18,541	26,429	55,829	65,552

Source: NICED

3.5.4 Current Status of Operation and Maintenance

In general, operation and maintenance status of the facility and equipment is highly satisfactory. Although some parts such as filters for air conditioners and spare parts for toilets need to be imported from Singapore, no trouble has been reported yet. The Atomic force microscope, which was provided to the division of electron microscopy by this Grant Aid Project, has not received any regular maintenance from the beginning. It is because no agent can provide such maintenance in Kolkata City. NICED has, however, started to find an agent outside of Kolkata City.

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

4. Conclusion, Lessons Learned, and Recommendation

4.1 Conclusion

This Project is highly relevant to the country's development plan and development needs, both at the time of planning and at the time of ex-post evaluation. As well, the Project was in line with Japan's ODA policy at the time of planning. Hence, its relevance is high. Efficiency is rated high since the expected outputs were obtained mostly as planned within the planned project cost and period. The Project has largely achieved its objectives, as thus, the effectiveness is also rated high. The synergetic effects of the series of JICA's cooperation contributed to reduce morbidity and mortality due to diarrheal diseases in the State of West Bengal as well as to activate collaborative research and to increase international reputation of NICED. Although one of the instruments was not properly maintained, sustainability of this Project is considered high in general in view of structural, technical, and financial aspects and current status of operation and maintenance. In light of the above, this Project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendation to ICMR

To accelerate approval procedure for "Multi-Center National Diarrhea Surveillance" and support smooth implementation of the network so that each State can effectively utilize NICED's technology in order to reduce morbidity and mortality from diarrheal diseases.

4.2.2 Recommendation to NICED

To arrange regular maintenance for the atomic force microscope.

4.3 Lessons Learned

- (1) Development of an overall plan, timely implementation, and development of trusting relationships

The series of JICA's cooperation to NICED created synergetic positive impacts. The successful factors of cooperation were 1) development of an overall plan, 2) timely implementation, and 3) development of trusted relationships. When developing a series of collaboration projects, it is ideal to carefully make an overall plan for all Projects based on lessons learned from the former Project. With the overall plan, each Project is required to implement on time in order to produce synergetic effects and impacts. Also, it is essential to clearly share vision and challenges among relevant stakeholders and develop mutual trust among them.

(2) Confirmation of equipment list with end-users

In this Project, a wrong model of equipment was provided by mistake due to lack of system to confirm details with end-users and also due to relatively large number of equipment. Hence, it is ideal that an implementation organization and a consulting company should carefully examine type of equipment and purpose of the use with end-users before finalizing the list for bidding.

(3) Thorough investigation for status of equipment at the time of investigation of detection

In the investigation of defection in this Project, any issues regarding equipment such as provision of inappropriate equipment and failure of regular maintenance were not revealed and hence any countermeasure was not taken at the time. It is ideal to confirm not only status of the facility provided but also status of operation and maintenance of the equipment.

(4) Close cost estimation on annual maintenance

In this Project, annual maintenance cost for the constructed facility was four times higher than the estimated cost at the time of planning. Although it has been affordable in this Project due to understanding and additional support from higher level of the institution till now, there is possibility to lower sustainability of the Project. Therefore, it is ideal to examine maintenance cost more closely including its feasibility at the time of planning.

(5) Set up target level for indicators on quantitative effects

In this Project, numeric target was not set up for quantitative effect indicators. It is ideal to set up proper numeric targets to secure objectivity of the evaluation.