Ex-Post Project Evaluation 2014: Package II-6

(Tonga, Fiji, Pakistan)

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Kingdom of Tonga

Ex-Post Evaluation of Japanese ODA Grant Aid Project

"The Project for Upgrading and Refurbishment of Vaiola Hospital (Phase II)"

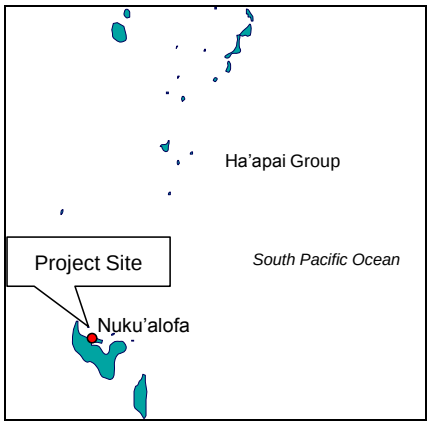
External Evaluator: Keisuke Nishikawa, Japan Economic Research Institute Inc.

0. Summary

In this project, an outpatient department building, etc. were constructed and a nursing school was expanded to improve medical services and strengthen the functions of human resource development in the health sector. The gist of this project was consistent with the development plan and needs of Tonga, as well as the priority areas of Japan's ODA policy. Therefore, the relevance of this project is high. With regard to project implementation, the project components were implemented mostly as planned, and the project cost and period were within the plan. Consequently, the efficiency is also high. With respect to project effectiveness, while the effects were observed in terms of the improved functions of the hospital, increases in the number of nursing school students and the content-rich education, it was difficult to obtain consistent data concerning the number of general outpatients, which made it impossible to draw quantitative conclusions to show that the project generated sufficient effects. It was confirmed additionally that Vaiola Hospital had been underpinning Tonga's medical system and activities as the top-referral hospital and also making certain contributions to the improvement of the people's health. Therefore, the overall effectiveness and impact of this project is fair. In terms of sustainability, some problems were identified in many respects as seen in the need to strengthen organisational and technical aspects, the reduction of maintenance budget in the financial aspect, as well as the time required to procure spare parts, meaning that the sustainability of the project can be judged to be fair.

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

1. Project Description



Project Location

Outpatient Department Building Constructed in the Project

1.1 Background

Vaiola Hospital (opened in 1971), the development target of this project, has been positioned as the only tertiary medical facility in Tonga, playing a core role in the provision of medical and healthcare services in the country. However, due to the deterioration of hospital facilities and medical equipment as well as an increase in outpatients, not only operating theatres but also the beds for post-surgery recovery and intensive care were not sufficient to provide good medical services to hospitalised patients. In addition to this problem, the hospital had infection risks as the sterile/unsterile areas were not clearly divided in the operating theatres and the main material sterilising room. The hospital also had other safety and environmental problems such as inefficient handling of sterilisation requirements because of the deteriorated steriliser in the main sterilising room, interruptions of proper diagnosis due to troubles of X-ray equipment, and contamination risks due to the insufficient capacity of wastewater treatment tanks receiving wastewater from the entire hospital.

In view of these circumstances, the Government of Tonga drew up the Vaiola Hospital Improvement Master Plan with support from the World Bank, aiming to improve the entire Vaiola Hospital. The improvement policy presented in the master plan was that the entire hospital would be improved with assistance from donors by dividing the construction and renovation work into six work sections. In the first stage of the master plan, the main examination ward, the obstetrics ward, the surgery ward, the septic tank as well as related medical equipment were improved through the grant aid from Japan in 2004. In the second stage, the internal medicine ward, the paediatric ward, and the mental health ward were constructed with assistance from the World Bank.

As the final stage of the master plan, the remaining outpatient, emergency and administration divisions were constructed and renovated, and the related medical equipment was procured in this project.

1.2 Project Outline

The objective of the project was to improve medical services and strengthen the functions of human resource development in the health sector by constructing new hospital facilities such as outpatient department building and expanding the nursing school at Vaiola Hospital.

Grant Limit / Actual Grant Amount	1,998 million yen / 1,717 million yen
Exchange of Notes Date / Grant Agreement Date	Detailed Design: December, 2009 / December, 2009 Construction: May, 2010 / May, 2010
Implementing Agency	Ministry of Health
Project Completion Date	March, 2012
Main Contractors	Construction: Kitano Construction Corp. Procurement: NBK Corporation
Main Consultants	The Consortium of Nihon Sekkei International Inc. and Nihon Sekkei, Inc.
Basic Design	November, 2009
Detailed Design	June, 2010
Related Projects	[Technical Cooperation] Project for Strengthening the Need-Based In-Service Training for Community Health Nurses (2011 – 2014) [Grant Aid] The Project for Upgrading and Refurbishment of Vaiola Hospital (2004 – 2006) [Other Donors] Australia: Non-medical Improvement Part 1 (1999 – 2004), Non-medical Improvement Part 2 (2002 – 2006) Asian Development Bank: Financial assistance (Budget support to the Ministry of Health, 2003) China: Health Centre Construction in Tongatapu (2008 – 2009) World Bank: Vaiola Hospital Improvement Project (2004)

2. Outline of the Evaluation Study

2.1 External Evaluator

Keisuke Nishikawa (Japan Economic Research Institute Inc.)

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule:

Duration of the Study: August, 2014 – July, 2015

Duration of the Field Study: October 27 – November 7, 2014 and February 23 – 27, 2015

3. Results of the Evaluation (Overall Rating: B[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance to the Development Plan of Tonga

At the time of project planning, Tonga's development plan 'Strategic Development Plan Eight' listed an improvement in healthcare services as one of the eight development goals. Also in the Corporate Plan of the Ministry of Health (2008/09-2011/12), one of six key result areas was the promotion of an improvement plan of Vaiola Hospital. As stated above, this project was implemented in line with the improvement master plan of Vaiola Hospital formulated with the assistance from the World Bank in 2002, and the outpatient department building, dental unit building, nursing school etc. were improved as the final phase of the overall plan[3].

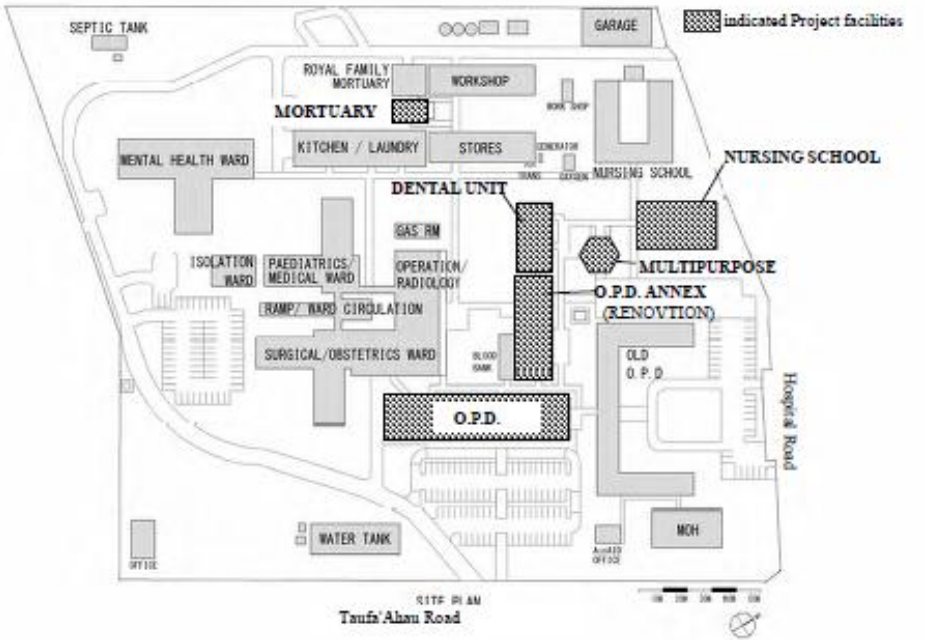
In the 'Tonga Strategic Development Framework (TSDF) 2011-2014', a development plan, effective at the time of ex-post evaluation, 'improved health of people' was the 'Outcome Objective 6' of the nine outcome objectives to improve the domestic network of health services centred around Vaiola Hospital. In the Ministry of Health Corporate Plan (2012/13-2014/15), formulated in accordance with this framework, one of six key result areas is to improve existing infrastructure facilities and to strengthen information and research functions.

In this way, this project, constituting part of the master plan, is consistent with Tonga's development plan both at the time of planning and ex-post evaluation, and is also in conformity to the sector-level strategies.

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

[2] ③: High, ②: Fair, ①: Low

[3] For the development of Vaiola Hospital, 'The Project for Upgrading and Refurbishment of Vaiola Hospital' was implemented in 2004-2006 as a project assisted by Japan, in which the main examination ward, the obstetrics ward, the surgery ward, etc. were developed.



Source: Preparatory Survey Report

Figure 1: Locations of Facilities Developed in the Project (Planned Facilities)

3.1.2 Relevance to the Development Needs of Tonga

Vaiola Hospital has a role to provide primary healthcare services to the residents on Tongatapu Island, where approximately 70% of the total population reside, in addition to a role as the top-referral hospital of Tonga with the population of a little over 100,000. As to the medical care, while primary healthcare has been gradually improving, non-communicable diseases (diabetes, high blood pressure, obesity, etc.) attributable to lifestyle habits have been increasing in recent years, and Vaiola Hospital is expected to respond to these diseases.

However, since a long time had passed since the hospital was opened in 1971, a variety of issues had been pointed out at the time of master plan formulation: scattering of medical examination sections, shortage of operating theatres, infection risks due to unclear sterile/unsterile areas, insufficient treatment capacity of sceptic tank and risks of contaminant dispersion, etc. It was an urgent challenge to improve these situations at Vaiola Hospital, positioned as the top-referral hospital in Tonga.

At the time of ex-post evaluation, non-communicable diseases such as diabetes, high blood pressure and obesity are major issues in Tonga, and the occurrence of sickness due to poor nutrition of children is also becoming a big issue. The Government of Tonga has focused on the enhancement of primary healthcare and promoted preventative healthcare. In tackling these issues, Vaiola Hospital has been playing a vital role as a top-referral hospital in Tonga as well as a medical facility to provide primary medical

services. It was also confirmed from the interviews that the hospital has substantially contributed to human resource development, particularly of the nurses who would be engaged in awareness-raising activities.

In various locations of the country including Tongatapu Island, while the provision of community-based medical services has been promoted by improving health centres, a number of patients are still receiving primary medical services at Vaiola Hospital.

Table 1: Number of Patients at Vaiola Hospital

Year	2011	2012	2013
Number of outpatients	46,607	53,254	51,103
Number of inpatients	9,791	10,164	9,913

Source: Data provided by the Ministry of Health

Table 1 indicates the numbers of outpatients and inpatients at Vaiola Hospital between 2011 and 2013. While these patient numbers fluctuate from one year to another, it is inferred that Vaiola Hospital has been expected to fulfil the needs of approximately 50,000 outpatients and 10,000 inpatients every year.

Although the development of the hospital based on the master plan was completed with the implementation of this project, it was confirmed in the ex-post evaluation study that the current (post-project) facilities at Vaiola Hospital were not sufficiently responding to the needs of medical data management that utilises information technologies at the Ministry of Health, after the master plan was formulated. Therefore, there is a development need of infrastructure for information management with the use of information technologies.

Based on the above, this project has been consistent with the development needs of Tonga both at the time of planning and ex-post evaluation, as this project developed Vaiola Hospital which was continuously positioned as a top-referral hospital as well as a hospital to provide primary health services at the time of ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policy

In the 'Islanders' Hokkaido Declaration' declared at the Fifth Japan-Pacific Islands Forum Summit Meeting held in 2009, Japan presented 'Support healthcare infrastructure' as one of the action plans for the Pacific region.

As a basic principle of ODA for Tonga, one of the key cooperation areas based on the above declaration was the support to 'enhance healthcare services'. A concrete measure for this area was the implementation of 'The Project for Upgrading and Refurbishment of Vaiola Hospital' (2004-2006), which improved some of the medical wards. This project has followed this series of development.

Therefore, this project is highly consistent with Japan's key cooperation areas for the Pacific and Tonga at the time of planning.

3.1.4 Appropriateness of Project Planning and Approach

This project was positioned as the last one of the projects implemented in accordance with the improvement master plan of Vaiola Hospital, as stated above. The needs of IT-related facility identified in the ex-post evaluation study did not seem to be a component foreseeable during the master plan formulation. Therefore, it is considered that there were no particular problems in terms of planning and approach of this project.

As described above, this project can be said to have been in line with Tonga's development plans and needs during the planning and ex-post evaluation, as well as Japan's ODA policy at the time of planning. Also, there were no problems in terms of the appropriateness of project planning and approach, and the overall relevance of this project is high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

The planned project components are as shown in Table 2.

Original

Table 2: Planned Components of This Project

	Major Development
Facility (5,108.6m^2)	O.P.D., Dental unit, Multipurpose space, Nursing school, Mortuary, Outside waiting area and passage with covered roof, New construction of ancillary mechanical room and renovation of O.P.D. annex
Medical Equipment	Procurement and installation of the equipment necessary for the project facilities (Emergency and general clinic, Special clinic, Antenatal, Physiotherapy, Outpatient pharmacy, Dental, Nursing school and Mortuary)

Source: Prepared based on the Preparatory Survey Report

Actual

The facilities (5,153.5m^2) and equipment indicated in Table 2 were all implemented mostly as planned, with the following changes as shown below.

Table 3: Changes from the Original Plan

	Changes
Changes from the plan in the preparatory survey	1) Change in the position of Multi-purpose Space 2) Change in the layout around emergency observation room 3) Change in the layout of the water area in the O.P.D. 4) Change in the layout of the area around antenatal reception 5) Change in the layout around the room of medical superintendent on the upper floor of the O.P.D. 6) Change of partition between managers' rooms on the upper floor of the O.P.D. 7) Change in the location of common restroom for the administration section on the upper floor of the O.P.D. 8) Change in the location of eye clinic rooms in the O.P.D. 9) Change in the layout around the staff room in the nursing school 10) Change in the layout in the mortuary 11) Change of the pharmacy's outside window and eaves 12) Change in the shape of the nursing school roof 13) Addition (1 unit) of binocular microscope for the dental unit
Changes after the detailed design study	1) Relocation of elevated water tank 2) Relocation of passage between buildings 3) Relocation of storage attached to the multipurpose space 4) Relocation of manager's room in the O.P.D.

Source: Information Provided by JICA

As shown in Table 3, many changes were made during the implementation of this project, but these were all minor changes without any inconveniences caused, according to the Ministry of Health. During the site survey as part of ex-post evaluation study, no particular inconveniences due to these changes were observed.

With regard to the procured equipment, it was confirmed that most of the key equipment were being used. However, a diagnosis unit at the otolaryngology department, expected to be used at the time of outreach activities, were not being used because there had been no outreach activities conducted yet. This is mainly because there is only one specialist in Tonga, leaving him no time to leave Vaiola Hospital. Also, a sand blaster at the dental technique unit could not be used as the compressor Vaiola Hospital originally had was broken. At the time of ex-post evaluation, while prosthetic teeth were made with an alternative method, it was heard that they could be made more precisely and efficiently by using the sand blaster. Therefore, it is desirable that a new compressor be procured.

In addition to the development items by Japan, Tongan side also implemented the ground levelling of the project site, relocation of electric cables, relocation of water discharge system, renovation of existing O.P.D. etc. before, during and after the project. At the time of ex-post evaluation, no negative influences of implementing these items on the generation of project effects were observed, and it can be said that there were no problems as a whole.

Waiting space in the O.P.D.

Simulation room in the nursing school installed in this project

3.2.2 Project Inputs

3.2.2.1 Project Cost

The cost of this project to be borne by Japan was planned to be approximately 1,998 million yen (76 million yen for the detailed survey and 1,922 million yen for the construction), with another 130 million yen planned as implementation expenses to be borne by Tonga.

Table 4 summarises the actual costs contributed by Japan.

Table 4: Actual Project Costs

(Unit: million yen)

Item			Cost
Detailed design survey			75.5
Tender, constriction, equipment procurement and installation	Construction	Direct constriction	1,242.9
		Other construction	124.1
	Equipment	Procurement	170.5
		Installation	6.0
	Design and Supervision		98.0
	Sub-total		1,641.5
TOTAL			1,717

Source: Prepared from information provided by JICA

The actual project cost was 1,717 million yen (Japanese side), which was confirmed within the planned amount (86% of the plan). Conversely, the cost borne by Tonga could not be obtained accurately since the data specific to this project had not been sorted out and stored. Consequently, the evaluation of the project cost was based on the comparison of the Japanese portion.

3.2.2.2 Project Period

The period of this project was expected to be approximately 28 months from December 2009 (Signing date of the Exchange of Notes for detailed design) till March 2012[4]. The actual project period was also 28 months from December 2009 as planned. According to the project consultant, there was much rain during the final phase of the construction work and it was feared that the construction schedule could be delayed. However, weekly meetings were held with the Ministry of Health to have good coordination among the related parties so that the project would not be delayed.

Based on the above, the outputs of this project were mostly as planned, and both the project costs and period were also within the plan. Therefore, the efficiency of the project is high.

3.3 Effectiveness[5] (Rating: ②)

3.3.1 Quantitative Effects (Operation Indicators)

It was expected that the number of general outpatients, dental clinic diagnosis, special outpatients, students at the nursing school and exchange programmes with overseas would increase by implementing this project.

Table 5: Operation Indicators of This Project

Indicator	Baseline	Target	Actual	Actual	Actual
	2008	2015	2011	2012	2013
	Baseline Year	3 Years After Completion	Before Completion	Completion Year	1 Year After Completion
General outpatients	66,625	Increase (76,600)	46,607	53,254	51,103
Patients in the dental clinic	26,321	Increase (29,000)	12,064	10,485	11,143
Special outpatients	7,173	Increase	No data	No data	No data
Number of students in the nursing school	92	Increase	120	103	129
Number of exchange programmes with overseas	3	Increase	No data	No data	4

Source: Data provided by the Ministry of Health

[4] The Exchange of Notes for the construction work was signed in May, 2010.
[5] Sub-rating for Effectiveness is to be put with consideration of Impact.

According to the Ministry of Health, the baseline data used at the time of planning were all based on the data when they were manually collected and aggregated, which are not consistent with the data in the health information system introduced after 2010. Also, since the optimal size of O.P.D. and dental unit buildings was calculated based on the number of patients during the peak time of consultation hours, they can cater for the number of patients set as target figures. Moreover, there is a possibility that the target figures were too high since the baseline data set at the time of planning were already far higher than the figures of 2007 or 2009. With these constraints considered, however, the evaluation of quantitative effects was based on the target figures expected at the time of planning in accordance with the usual judgement criteria, while the 'improvement of medical services', set as the project objective, was emphasised in this ex-post evaluation study. In terms of the improvement of medical services, medical examinations of outpatients can be performed at Vaiola Hospital. It was also confirmed from the interviews with the Ministry of Health that the medical quality had also improved under the environment where more modernised facilities and equipment were developed and sterile/unsterile areas became clearer. Overall, it can be judged that there are no particular problems.

However, Table 5 shows that the special outpatient numbers have remained unknown and the number of outpatients and dental patients are not only lower than the target figures but also the baseline figures. Nevertheless, the demand has always been met without any patients forced to wait for medical consultations due to insufficient capacities of Vaiola Hospital[6]. Doctors expressed their opinions that they were not feeling any decrease in the number of patients as they were always busy in performing medical examinations during consultation hours. The Ministry of Health admits that insufficient data development system is the major cause of inconsistent data, but it was difficult to prove that the project effects were fully achieved under the constraint where an analysis through data comparison was not possible.

On the other hand, the number of students at the nursing school and the number of exchange programme in 2013 already exceeded the target figures set for 2015, and they are expected to be higher than the target figures even when the 2015 actual figures are confirmed. While the nursing school had not been able to supply required number of nurses at the time of planning due to constraints of the facility size, they became able to increase the number of students after the implementation of this project. It was also confirmed from the interviews and simplified beneficiary survey[7] that the education

[6] The population of Tonga has been a little over 100,000 in recent years, and little change has been observed due to the effects of outmigration overseas.

[7] A questionnaire survey with a total of 51 doctors, nurses and other hospital staff working at Vaiola Hospital

environment has significantly improved in many respects as the students are now able to apply what they learned to actual practices and it is easier for them to do surveys and prepare documents by utilising a computer room. It is also the only nursing school in Tonga, making a significant contribution to the supply of human resources. Regarding the number of exchange/twinning programmes with overseas institutions, programmes with other countries such as Australia expanded after the improvement of facilities and equipment, to develop capacities of Tongan hospital staff members. The key contents of the programmes observed at the time of ex-post evaluation are outlined in Table 6.

Table 6: Outline of Exchange/Twinning Programmes with Other Countries

Name of Programme	Key Contents
Twinning Programme between the Ministry of Health and St. John of God Ballarat, Australia	An exchange programme of staff members between Ballarat Hospital, Australia and the Ministry of Health, Tonga, covering various areas such as emergency medicine, midwifery, health information, etc. An Australia's aid programme going for 22 years
Twinning Programme between the Ministry of Health (Radiology Section) and the Lake Imaging, Ballarat, Australia	An exchange programme to improve capacities of radiology services in Tonga. Commenced in 2013 with assistance from Australia
Twinning Programme between the Ministry of Health (Health Promotion Section) and Nossal Institute Limited, University of Melbourne, Australia	An exchange programme for capacity building on non-communicable disease. Commenced in 2012 with assistance from Australia
Twinning Programme between the Ministry of Health and PPTC, Wellington, New Zealand	A one-month training programme for the trainees undertaking a Diploma in Medical Laboratory Science programme online. Implemented with assistance from New Zealand

Source: Prepared from the information provided by the Ministry of Health

3.3.2 Qualitative Effects (Other Effects)

At the time of planning, the following qualitative effects were expected by implementing this project.

1) Functions of outpatient and emergency departments will be re-established and the quality of medical services will be improved.

for over five years was conducted. The survey concerned the improvement of medical services, improvement of medical facilities and equipment, improvement of hygienic conditions, improvement effect of the nursing school, improvement in the quality of education and training, position as the disaster rescue base as a result of this project and the maintenance conditions.

2) Practical training at the Nursing School will be enriched.
3) Efficient and high-quality education, training and workshops will be enabled.

With regard to 1), congestions of the waiting area were eliminated with the expansion of space at the outpatient department, and the emergency department, which used to use part of the outpatient department space, became able to secure its own area. The staff of the emergency department commented that more prompt response to the patients transported in ambulances became possible after the facilities and equipment were improved substantially. Vaiola Hospital, the top-referral hospital in Tonga, has been positioned as a hospital to respond at any time to referrals from health centres in Tongatapu Islands, where the capital Nuku'alofa is located, and also from the regional hospitals in other island groups. According to the Ministry of Health, examinations and treatment are now smoothly performed in various departments and the latest ultrasonic diagnosis equipment is utilised though it was not possible in the past through the overall improvement including the facilities and equipment provided in this project.

Regarding 2), the enrichment of practical training at the nursing school, it was heard that not only the improvement of facilities made it easier to do lectures but also more practical education became possible with actual training with the equipment such as homunculus. The simplified beneficiary survey also showed that 81% of the hospital staff responded that education and training at the nursing school improved, substantially exceeding 19% of the respondents with 'Not really improved'.

As for 3), a seminar room was provided in the O.P.D., which was utilised for training sessions among the hospital staff every Wednesday and various meetings. It was also confirmed that a multipurpose space, constructed in this project, was being utilised for seminars and workshops of nurses and student nurses. It can be said to have become easier to work on capacity development activities for the hospital staff after this project was implemented.

Based on the above, it can be evaluated that the qualitative effects expected at the time of planning have sufficiently been achieved after this project was implemented.

3.4 Impacts

3.4.1 Intended Impacts

At the time of project planning, two impacts of project implementation were expected, which were 'Improvement of the hospital as Tonga's top-referral hospital would improve the health of all Tonga people', and 'Tonga's disaster rescue base would be developed'.

With regard to the improvement of health conditions, Table 7 shows the key

indicators. Since Tonga's health indicators had already reached a high level in general and slight changes in number would lead to large changes in percentage due to its small population size, little improvement in health indicators can be observed in recent years. Also, as the data have not necessarily been well developed, the indicators after the implementation of this project were not obtained. However, the majority of the hospital staff consider that the reliability as the top-referral hospital is high as shown in the result of the simplified beneficiary survey with the hospital staff demonstrating that 86% of the respondents felt that the credibility and reliability as the top-referral hospital 'Improved a lot' or 'Improved' (the remaining 14% responded that it was the 'Same'). It also became clear that 86% of them consider that the quality of medical services improved after the implementation of this project. While it is difficult to show quantitative achievements from the health indicators, it is assumed that this project has made certain contributions to the improvement and sustenance of health conditions of Tongan people.

Table 7: Key Health Indicators

Indicator	2008	2009	2010	2011
Infant mortality rate (per 1,000)	16.4	14.5	21.5	15.2
Perinatal mortality rate (per 1,000 live births)	18.9	13.5	12.4	13.0
Maternal mortality rate (per 100,000)	76.1	114.4	37.1	0
Immunisation coverage (%)	99.5	99.5	99.6	99.8

Source: Report of the Minister for Health (FY2011/2012)

As shown in Table 8, Vaiola Hospital received 37 – 67 patients referred from other hospitals in the country annually in recent years as the top-referral. The main reasons were operations and radiological examinations. However, some patients are further referred to Australia and New Zealand when there are cases in which Vaiola Hospital cannot accommodate.

Table 8: Number of Referrals at Vaiola Hospital

	2009/10	2010/11	2011/12	2012/13	2013/14
Number of domestic referral	53	42	37	45	67
Number of overseas referral	34	27	41	62	47

Source: Data provided by the Ministry of Health
Note: 'Domestic referral' shows the number of referrals from health centres and regional hospitals to Vaiola Hospital. 'Overseas referral' shows the number of referrals from Tonga to overseas countries.

As for the role as a disaster rescue base, expected as the second impact, it was heard from Vaiola Hospital that the structure of Vaiola Hospital was solid and of high-quality in comparison to other buildings in the centre of capital Nuku'alofa. The simplified

beneficiary survey also showed that 90% of the respondents provided positive responses regarding the quality of the hospital to be used as the evacuation facility at the time of disasters such as cyclones.

Therefore, while there have been no cases where large-scale disasters actually occurred and the residents evacuated or were transported to the hospital, it was confirmed that the majority of hospital staff have positively regarded the role as the evaluation facility since the hospital is a sufficiently large facility with solid structure located in the capital. It is considered that the hospital could well be utilised as the disaster rescue base.

With respect to the hygienic environment of the entire hospital, the implementing agency commented that it improved after this project was implemented. In the simplified beneficiary survey, 86% of the respondents also replied that it improved. It was confirmed that hygienic control improved in terms of structural and non-structural aspects since the efforts to control hygienic conditions (activities of hygiene management committee and the wearing of shoe cover at the pharmacy) were being made in addition to the implementation of this project.

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

It was considered that this project would not cause any undesirable impact on the natural environment as this project consisted of the development of facilities and the procurement of equipment at the existing hospital.

When this project was implemented, it was planned that the following consideration on the natural environment would be made.

- ✓ Reduction of maintenance cost with the active utilisation of natural energy
- ✓ Treatment of discharged water in accordance with Tonga's standard

The medical waste from the planned facilities was expected to be disposed of at the special facility after it was separated from general waste and treated with a high pressure incinerator.

No negative impacts on the natural environment due to the implementation of this project were observed during and after the project, when checked during the ex-post evaluation study. The wastewater was treated in the treatment plant installed in this project and infiltrated within the premises, which is the planned treatment method and there have been no reports of negative impact on the natural environment. However, medical wastes were being disposed of in the special section in the landfill after they

were separated from general wastes, after the special incinerator recently broke down. While waste management is beyond the scope of this project, it is considered necessary that adequate measures be taken as it is desirable that they get disposed of after incineration.

Regarding the reduction of electricity costs through active utilisation of natural energy, solar panels were installed on the roof of O.P.D. in this project, which were expected to cater for some of the electricity consumption at Vaiola Hospital. While the hospital had not recorded the amount of electricity generated through this photovoltaic generation system and it was not known how much of consumption has been relieved by this system, the Ministry of Health estimated that approximately 20% of the total consumption is generated in this system. As the amount of electricity consumption has been increasing year by year as they have more medical equipment and air conditioners, it can be inferred that the system has a certain role in curbing the payable electricity costs.

Solar panels installed in this project

3.4.2.2 Land Acquisition and Resettlement

At the time of planning, neither resident resettlement nor land acquisition was expected as the components of this project were to construct facilities and procure equipment within the existing hospital premises. It was confirmed at the time of ex-post evaluation that there were no problems as all the facilities were constructed within the existing premises and no resident resettlement or land acquisition was observed.

In regard to effectiveness, it was not possible to draw the conclusion that sufficient effects were generated since it was difficult to quantitatively demonstrate the indicators as the consistency of data provided by the Ministry of Health was not ensured. However, adequate medical treatment has been provided to all patients and a certain level of effects was observed. Regarding the qualitative effects, improvements in the hospital's functions, enrichment of practical training at the nursing school and its supply of human resources, and the effective utilisation of the facility on the seminars among the hospital staff were confirmed and it is therefore considered that the project effects have been generated.

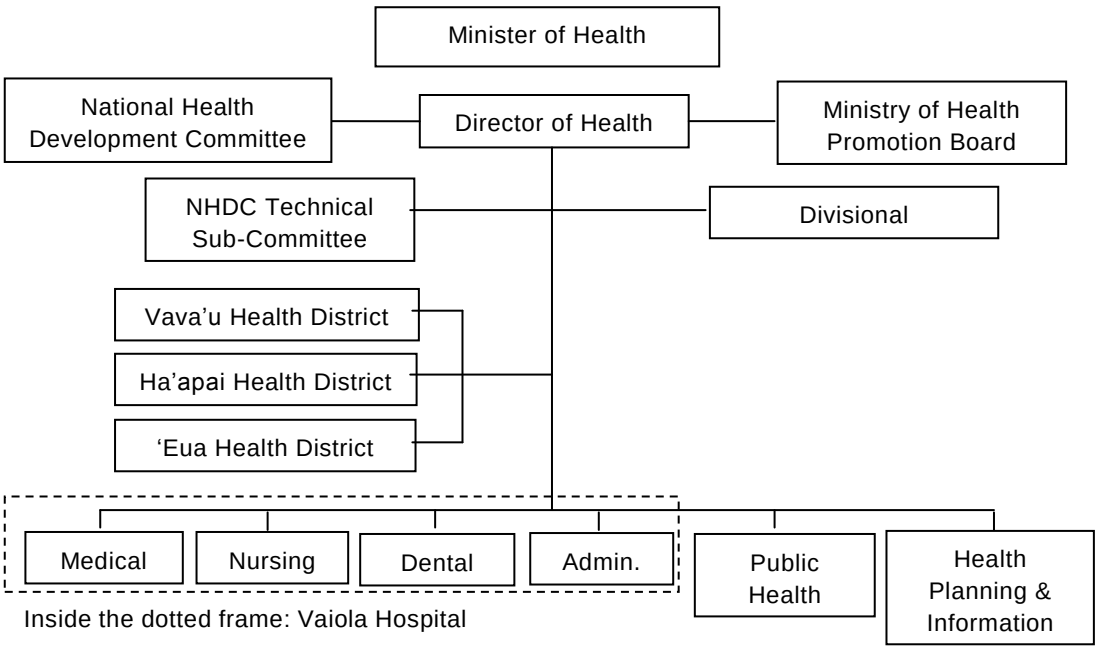
As to the impact of the project, it was assumed that the project underpinned Tonga's medical structure and activities as the top-referral hospital and made certain contribution to the improvement of people's health, while some data were not sufficiently developed. Also, no negative impacts on the natural environment have been observed, and no land acquisition or resettlement cases have occurred. Therefore, it is considered that sufficient impact of the project has been generated.

In light of the above, this project has to some extent achieved its objectives; therefore the effectiveness and impact of the project are fair..

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

The implementing agency of this project is the Ministry of Health. However, the Ministry of Health and Vaiola Hospital are not clearly divided. For example, the 'Administration Department' covers both the administration of the entire Ministry of Health as well as Vaiola Hospital. Also, the building of the Ministry of Health is located within the premises of Vaiola Hospital.



Source: Prepared from the Ministry of Health Corporate Plan (2012/13-2014/15)

Figure 2: Organisation Structures of the Ministry of Health and Vaiola Hospital

At the time of ex-post evaluation, the Ministry of Health had 769 staff members and the table below shows the staff numbers by function. Of these, the total number of

Vaiola Hospital staff is 632 in four departments of administration, dental, medical services and nursing.

Table 9: Ministry of Health Staff Number (2015)

	No. of Staff	Percentage
Administration	78	10%
Health Planning / Information	25	3%
Public Health	112	15%
Dental	32	4%
Medical Services	160	21%
Hospital Nurses (including the nursing school)	362	47%
TOTAL	769	100%

Source: Data provided by the Ministry of Health

The maintenance section, a total of nine staff headed by the medical superintendent, is in charge of the maintenance of facilities and equipment at Vaiola Hospital. An electrical engineer concurrently serves as a biomedical technician and one plumber post (two posts assigned) has been vacant. Also, an Australian expert, supported by Australian aid, was permanently positioned as the biomedical engineer. The number of staff in the maintenance section decreased from the planning period despite the expansion of facilities and the increase in equipment through this project, and no particular measures have been taken. Therefore, the existing staff members have not necessarily been able to accommodate the needs of repair received from various departments, and it was considered important to secure sufficient number of staff. It was heard that cleaning work has been outsourced to an external private company, and casual workers will be employed for painting and repair work when necessary.

3.5.2 Technical Aspects of Operation and Maintenance

An inspection at the time of ex-post evaluation did not detect any particular concerns regarding the technical aspects of utilising the equipment as the equipment procured in this project were being used by doctors, nurses and technicians without any problems.

Regarding the maintenance of the hospital facilities, no particular issues were observed in terms of the basic technical skills of the staff in the maintenance section, supervised by a well-experienced mechanical supervisor. As for the maintenance capacity of medical equipment, technical skills are not sufficient without any qualified personnel or well-experienced technician in the Ministry of Health. However, it was confirmed at the time of ex-post evaluation that one Tongan technician was being trained at a specialised institution in Australia under the Australian assistance. It is

hoped that the skills will be improved and the capacity and the structure to manage medical equipment will be strengthened in the future.

Regarding other training, no systematic training has been conducted for maintenance, but a programme on biomedical equipment has been conducted annually at the Fiji National University with the Australian support. It was planned that a technician of the Tongan Ministry of Health would participate in this training programme.

3.5.3 Financial Aspects of Operation and Maintenance

Revenues from fees collected for hospitalisation or examination contribute to the budget of the Ministry of Health, but basically, as medical care and medicines have been traditionally free of charge, the majority of the budget is allocated by the government. At the time of planning, there was a plan to collect medical charges to reduce financial burden once the overall project for upgrading Vaiola Hospital was completed, but this plan has never been implemented even by the time of the ex-post evaluation. The government has continued to bear all the costs of medical care and medicines.

The overall budget of the Ministry of Health and its maintenance budget in recent years are shown in Table 10.

Table 10: Total Budget and Maintenance Budget of the Ministry of Health

(Unit: 1,000 Pa'anga)

Financial Year	2008/09	2009/10	2010/11	2011/12
Budget of the Ministry of Health	21,580	21,375	22,500	22,596
(of which Vaiola Hospital's revenue)	(506)	(1,000)	(1,000)	(1,000)
Maintenance budget	1,321	1,500	1,200	975
(Proportion of maintenance budget against the total budget)	(6.1%)	(7.0%)	(5.3%)	(4.3%)

Source: Report of the Minister for Health, Data provided by the Ministry of Health

While the Ministry of Health budget has been gradually increasing from previous years, the maintenance budget has been decreasing both in terms of the absolute amount and the proportion against the total Ministry of Health budget. The maintenance section also expressed their views that the budget was always insufficient. When the support for the redevelopment of Vaiola Hospital was provided, there was an agreement with the World Bank to set the maintenance budget at 7% of the total Ministry budget, which was once achieved in the FY 2009/10. However, it has declined to 5.3% then to 4.3%. It is essential to stop this trend as the hospital facilities have been expanded and the medical equipment increased, and allocate sufficient amount of budget.

It is assumed that medical equipment needs to be gradually replaced as they reach their durable life, but there was no plan for the replacement of medical equipment. There was also a concern on the renewal of equipment in the future as the average inspection and repair costs as well as the amount needed for the equipment replacement were not calculated and budgeted accordingly.

3.5.4 Current Status of Operation and Maintenance

During the site survey of this ex-post evaluation study, it was confirmed that all the facilities developed in this project were being used and most of the equipment, apart from the diagnosis unit at the otolaryngology department and the sand blaster at the dental unit, were also being used. There were no problems observed with the utilisation of the equipment manuals as they were stored in the biomedical workshop etc. and used when necessary.

No written maintenance plan has been formulated but a weekly inspection of facilities was being conducted by the maintenance section staff. While there were no major problems observed in terms of the operation and maintenance of facilities at the time of ex-post evaluation, maintenance management contract of elevators which had been installed even before this project was implemented has not been renewed since 2012, after the maintenance contract with an agent in New Zealand was terminated.

The medical equipment would be repaired if they had any trouble or broke down, but it was observed that those repairs were not recorded properly. As a countermeasure of such situations, the Australian expert introduced the 'Maintenance Assist', a programme suite widely used in the world for maintenance management. On the other hand, however, contracts of periodic maintenance management of biomedical equipment were not deemed realistic as there were no agents in Tonga that could undertake the management and an overseas agent would be too expensive.

There were issues in terms of the procurement of spare parts for the facilities and equipment that a long time was required to coordinate with agents or contact manufacturers. It was also pointed out from the hospital staff that other issues could be found that a long time was required to get the budget allocated after the application was submitted, and that the maintenance section did not have sufficient authority to execute the budget and had to go through time-consuming approval process.

Based on the above, the current status is that a maintenance plan has not been formulated, and it cannot be said that a preventative maintenance system has been in place as the repairs are made only when the equipment has troubles, except periodic inspections of the facilities. The current status of maintenance can be said to be generally satisfactory, but concerns are felt regarding the responses when equipment

break down more frequently as there are issues in terms of periodic maintenance management and the procurement of spare parts.

Small problems were identified in all aspects of operation and maintenance. The organisational structure for operation and maintenance cannot be said to be sufficient and it is considered that the staff numbers need to be increased. While there are no particular issues regarding the technical capacity to maintain the facilities, capacity needs to be developed on the management of medical equipment. With regard to financial aspects, the maintenance budget has been gradually decreasing, making the maintenance section facing the shortage of budget. The maintenance status is generally satisfactory, but no preventative maintenance system has been implemented and a long time is required for the procurement of spare parts.

In light of the above, some problems have been observed in terms of organisational technical and financial aspects. Therefore, the sustainability of the project effects is fair.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

In this project, an outpatient department building, etc. were constructed and a nursing school was expanded to improve medical services and strengthen the functions of human resource development in the health sector. The gist of this project was consistent with the development plan and needs of Tonga, as well as the priority areas of Japan's ODA policy. Therefore, the relevance of this project is high. With regard to project implementation, the project components were implemented mostly as planned, and the project cost and period were within the plan. Consequently, the efficiency is also high. With respect to project effectiveness, while the effects were observed in terms of the improved functions of the hospital, increases in the number of nursing school students and the content-rich education, it was difficult to obtain consistent data concerning the number of general outpatients, which made it impossible to draw quantitative conclusions to show that the project generated sufficient effects. It was confirmed additionally that Vaiola Hospital had been underpinning Tonga's medical system and activities as the top-referral hospital and also making certain contributions to the improvement of the people's health. Therefore, the overall effectiveness and impact of this project is fair. In terms of sustainability, some problems were identified in many respects as seen in the need to strengthen organisational and technical aspects, the reduction of maintenance budget in the financial aspect, as well as the time required to procure spare parts, meaning that the sustainability of the project can be judged to be fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

Strengthening of Maintenance Structure

It is expected that the items and the expenses required for maintenance of facilities and equipment will increase as a series of projects specified in the master plan for the redevelopment of Vaiola Hospital were completed. However, no additional staff member has been hired for that purpose and there has even been a vacant position. It is desired that the structure be established promptly. Also, the maintenance budget has recently decreased, falling short of the target of 7% and not enabling the implementation of preventative maintenance of facilities and equipment. Therefore, it is important to formulate a maintenance plan, calculate and secure necessary amount of budget every year (including the accumulation of replacement fund for equipment renewal), and make the budget execution process easier to enable smooth procurement of spare parts. To be more specific, the 'Maintenance Assist' as described in '3.5.4 Current Status of Operation and Maintenance' can be utilised to formulate a maintenance plan, calculate the amount annually required and secure the maintenance budget. It is also important to raise awareness within the government to enable the Ministry of Health and its departments to have stronger authority to execute the budget independently.

Development of Consistent Data

When the project effects were to be measured in this study, the basis of the figures obtained at the time of project planning was unclear, which did not make it possible to compare the data with the ones submitted at the time of ex-post evaluation. There were also some cases found where the basic data on the operation of the hospital were not well developed. In providing healthcare and medical services, it is essential to develop basic data and strengthen the structure to collect and develop consistent data so that objective recognitions and responses will become possible.

4.2.2 Recommendations to JICA

Monitoring of Operation and Maintenance Status

With regard to the maintenance of medical equipment, which was pointed out as an issue in this project, an expert was dispatched with the assistance of Australia, assisting with the establishment of maintenance system and the capacity development of the staff concerned. Japan supported the development of the facilities and equipment of Vaiola Hospital twice, in which there were a number of equipment procured. Therefore, it is important to closely coordinate with the Australian expert and monitor the equipment

for their effective utilisation.

4.3 Lessons Learned

Periodical Confirmation and Flexible Review of the Overall Plan

This project was implemented in accordance with the master plan concerning the overall development of the hospital. As the overall plan proceeds, it was considered necessary to improve the structure, technique and budget for the operation and maintenance of expanded facilities and increased equipment. As the overall plan was practically divided into four phases and implemented, it was considered to have been desirable to regularly check the strengthening status of these aspects so that future operation and maintenance would not be faced with concerns. If sufficient measures have not been taken, necessary capacity development support can be provided in addition to the development of facilities and equipment, or the project can be downsized to fall within the operation and maintenance capacities. It is assumed necessary to regularly check and flexibly modify the planned components in a long-term project.

Monitoring of Project Effects

In the ex-post evaluation of 'The Project for Upgrading and Refurbishment of Vaiola Hospital', conducted in 2010-2011, a recommendation was made to the implementing agency that the maintenance section be improved. However, the recommendation cannot be said to have been sufficiently implemented. In order to promote the generation of project effects and enhance the sustainability of generated effects, it was thought meaningful that JICA's department in charge or the overseas office regularly conducted monitoring activities for a certain period of time; at least till an ex-post evaluation study was conducted. Through such monitoring activities, actual actions promoted by the implementing agency can be expected. Therefore, it is desirable that the project be followed after the completion of the project.

(End)

Republic of Fiji

Ex-Post Evaluation of Japanese ODA Grant Aid Project

"The Project for Construction of Information and Communication Technology Center at the University of the South Pacific"

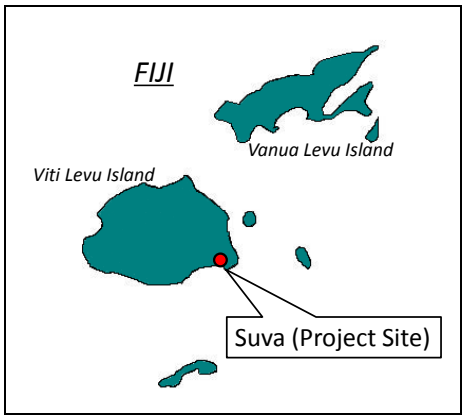
External Evaluator: Keisuke Nishikawa, Japan Economic Research Institute Inc.

0. Summary

In this project, Information and Communication Technology (hereinafter referred to as 'ICT') / distance education facilities and a research and development environment were developed at the University of the South Pacific (hereinafter referred to as 'USP') to improve ICT education and training functions and human resource development functions in the ICT sector in the Pacific region. This project was consistent with the development plan and needs of Fiji and the entire Pacific region, as well as the priority areas of Japan's ODA policy. Therefore, the relevance of this project is high. With regard to project implementation, while the project components were implemented mostly as planned, the project cost exceeded the plan due to a surge in construction costs, associated with a substantial extension of the project period. Consequently, the efficiency was judged to be low. With respect to project effectiveness, quantitative targets expected at the time of planning were achieved as a whole, and other qualitative effects, such as an improvement in lectures and actual practices, utilisation of newly constructed Multi-purpose Theatre and commencement of international research projects, were also observed. It was confirmed as an impact that the ICT Centre made significant contributions to the development and production of ICT professionals in the region. Therefore, the effectiveness and impact of this project is high. In terms of sustainability, no particular issues were identified in institutional, technical and financial aspects as well as the current status of operation and maintenance, meaning that the sustainability of the effects of this project is considered to be high.

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

1. Project Description



Project Location

Information and Communication Technology Centre developed in this project

1.1 Background

In the Pacific region, digital divide was obvious due to its peculiar geographical conditions in which islands were scattered across the vast ocean area, resulting in slow development of communication networks. It was regarded important to further develop the ICT sector for socio-economic development of the region and necessary to develop infrastructure and human resources for that purpose.

ICT education in the Pacific region had been centred around USP which was co-established in 1968 by 12 island countries and territories. However, enrolment numbers were continuously growing in recent years and there was a shortage of facilities and equipment. In particular, the facilities and equipment of ICT-related programmes had not been developed to accommodate the increase in student numbers (from approximately 9,000 in 2002 to over 10,000 in 2005), and especially the lectures of the Department of Computer Science were provided in hurriedly constructed wooded buildings. In addition, the university did not have a theatre which could accommodate a large number of audience, which required divisions of a large group into smaller classrooms and the use of facilities on different campuses. Although the curriculum required a use of the theatre for 79 hours a week, the existing theatre (with a capacity of 242 people) could be used only for 40 hours a week. As a result, there were restrictions on the number of classes and larger burdens on students and lecturers, leading to insufficient quality and quantity of ICT education required for USP.

1.2 Project Outline

The objective of the project was to improve ICT education and training functions and human resource development functions in the ICT sector by developing ICT / distance

education facilities and a research and development environment at the University of the South Pacific in Fiji.

Grant Limit / Actual Grant Amount	Detailed Design: 75 million yen / 75 million yen Phase 1: 2,201 million yen / 2,140 million yen Phase 2: 857 million yen / 855 million yen
Exchange of Notes Date / Grant Agreement Date	Detailed Design: February, 2008 / None Phase 1: May, 2008 / None Phase 2: November, 2009 / November, 2009
Implementing Agency	The University of the South Pacific (USP)
Project Completion Date	Phase 1: April, 2010 / Phase 2: September, 2011
Main Contractors	Construction: (Phase 1 & 2) Konoike Construction Co., Ltd. Procurement: (Phase 1) LOT1: Konoike Construction Co., Ltd. LOT2: Kanto Bussan Co., Ltd. (Phase 2) Konoike Construction Co., Ltd.
Main Consultant	(Phase 1 & 2) Azusa Sekkei Co., Ltd.
Basic Design	January, 2006
Detailed Design	January, 2009
Related Projects	[Technical Cooperation] The Project for Upgrade of USPNet Communications System (2000 – 2002) Information and Communication Technologies (ICTs) Capacity Building at the University of the South Pacific (2002 – 2005) ICT for Human Development and Human Security Project (2010 – 2013) [Other Donors] (Australia) Curriculum Improvement Project (New Zealand / EU) Financial Cooperation (Other (Taiwan, etc.)) Computer Laboratory Improvement Project, etc.

2. Outline of the Evaluation Study

2.1 External Evaluator

Keisuke Nishikawa (Japan Economic Research Institute Inc.)

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule:

Duration of the Study: August, 2014 – July, 2015

Duration of the Field Study: November 7 – 19, 2014 and February 27 – March 5, 2015

3. Results of the Evaluation (Overall Rating: B[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance to the Development Plan of Fiji

At the time of project planning, Fiji's national development plan 'Strategic Development Plan 2003-2005' listed a medium term strategy to 'Rebuilding Confidence for Stability and Growth to achieve a Peaceful, Prosperous Fiji'. In this strategy, universal access to internationally competitive information and communication technology services was specified as one of the goals to be achieved. Additionally, at the sector level, the 'Fiji Information and Communication Technology Policy 2003-2005' also set a target to make Fiji a centre of ICT in the Pacific with its digitalised economy and ICT-capable citizens.

USP has a character as a jointly operated higher education institute not only for Fiji but also the Pacific region. From the regional perspective, not just for Fiji, at the 2005 Pacific Islands Forum[3] (hereinafter referred to as 'PIF'), member countries approved the 'Digital Strategy' to disseminate and develop distance education with ICT, which indicates that this project was consistent with the direction of the entire region at that time. In addition, USP formulated the 'USP Strategic Plan 2006-2010' to promote effective utilisation of the USPNet, a shared network in the region.

In the 'Roadmap for Democracy and Sustainable Socio-Economic Development 2010-2014', Fiji's national development plan at the time of ex-post evaluation, greater use of ICT was deemed essential for social and economic development and the goal was set to achieve universal access to information and competitive telecommunication services. At the sector level, the 'Fiji National ICT Policy', prepared in 2012, sets out seven key objectives including the one to achieve accessible and affordable communications for all.

From the regional perspective, according to the PIF Secretariat, the Digital Strategy was still effective at the time of ex-post evaluation and the improvement of education

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

[2] ③: High, ②: Fair, ①: Low

[3] Pacific Islands Forum (PIF) is a forum of dialogue annually held among the political leaders of the Pacific islands, where regional interests such as political, economic and security issues are broadly discussed. The secretariat is located in Suva, capital of Fiji.

with the use of ICT continued to be important at all educational levels. The 'USP Strategic Plan 2013-2018', the utilisation of ICT was also listed as the 'Priority Area 4' with four objectives, such as 'Ensure that ICT provision adequately meets the University's needs' and 'Take a lead role in the region's ICT development'. Moreover, it was observed that USP was trying to enhance its research environment by utilising ICT, as seen in the 'Knowledge Hub Concept', a plan to pursue the sophistication of research platforms with the utilisation of ICT.

As seen above, it was confirmed that, both at the time of planning and ex-post evaluation, Fiji set a national policy target to disseminate ICT and the ICT sector-specific policy also had a target to promote the utilisation of ICT by the people. At the regional level in the Pacific, it was also confirmed that the importance of education with the utilisation of ICT was set out as the direction of regional development and that USP, a regional higher education institute, always had a strategic plan to enhance education and research by utilising ICT. Therefore, this project can be judged to be highly consistent with these development plans.

3.1.2 Relevance to the Development Needs of Fiji

At the time of planning of this project, digital divide in the Pacific region was obvious and the quality and quantity of ICT education were not ensured at USP though it had more than 10,000 students in 2005, as the development of information and communication facilities and equipment was not catching up with it. For example, a server room was too small to make additional installation while the improved reliability of the campus network was much desired. The ICT education environment needed to be improved qualitatively and quantitatively as the computer rooms for the Department of Computer Science were absolutely insufficient (approximately 60% sufficiency) and a lecture theatres were overcrowded.

The number of students at USP has continued to increase after that, and so is the number of students by country of origin at the School of Computing, Information & Mathematical Sciences (hereinafter referred to as 'SCIMS') as shown in Table 1.

Table 1: Number of Students by Country of Origin
at the School of Computing, Information & Mathematical Sciences

Country of Origin	2010	2011	2012	2013	2014
Cook Islands	6	6	3	2	1
Federated States of Micronesia	4	4	2	7	5
Fiji	997	981	1,010	1,080	1,135
Kiribati	52	54	46	47	52
Marshall Islands	4	3	1	1	0
Nauru	2	2	3	6	5
Palau	0	1	3	2	1
Papua New Guinea	0	2	4	4	1
Samoa	27	22	24	23	49
Solomon Islands	136	165	164	153	142
Tokelau	3	1	0	1	1
Tonga	87	106	113	129	116
Tuvalu	25	26	30	33	24
Vanuatu	65	68	84	91	95
Other	3	1	0	4	4
合計	1,411	1,442	1,487	1,583	1,631

Source: Data provided by USP

From the above table, it is clear that the majority of SCIMS consists of Pacific students, whose number has gradually been increasing every year. It can be inferred that the needs for human resource development on ICT in the region have consistently been high from the time of planning till ex-post evaluation.

The data traffic has also increased as the number of these students became larger. In response this change, USP enhanced communication processing capacities four times faster from the time of planning, to speed up data communications. USP will further keep improving the communication environment by reflecting the needs in education and research. This project, which supported the improvement of communication environment, is consistent with the needs for ICT education.

As a result of implementing this project, the shortage of facilities and equipment seen at the time of planning had been resolved by the time of ex-post evaluation. However, it was heard from the university staff that as further increases in student numbers and technology advancement are expected, it will be important to keep developing ICT-related facilities and equipment. If they occur, the facilities developed in this project are also considered to become boxy.

3.1.3 Relevance to Japan's ODA Policy

In the leader's declaration adopted at the Fourth Japan-Pacific Islands Forum Summit Meeting (commonly known as PALM) held in 2006, Japan presented to the Pacific island countries five key priority areas, economic growth, sustainable development,

good governance, security and people to people exchange, and announced its intention to support these areas. This project supported the higher education sector in the Pacific and 'Education' is included in the 'Sustainable development', one of the key priority areas of Japan to the Pacific at the time of planning. Assistance in the education sector had a listing of equipment for distance education and the improvement of knowledge at USP. Therefore, this project can be said to have been consistent with the policy.

In the ODA policy at that time, grant aid projects needed to be implemented as a regional project to benefit neighbouring countries as Fiji had high income levels. While this project was a grant aid project for Fiji, it was also a regional project to benefit other Pacific island countries. Therefore, this project was judged to have been consistent with the ODA principles

3.1.4 Appropriateness of Project Planning and Approach

This project was implemented by considering the high needs for ICT education at a higher education institute benefiting the Pacific region, and its project planning and approach did not seem to have had any problems, without negative items to be pointed out in particular.

The development of USPNet, a basis to enhance distance education in each Pacific island country, was an area Japan cooperated for many years. It can be said to have been an adequate planning and approach that this project was implemented according to the needs for ICT education in the Pacific were captured through the long-term cooperation. University staff members highly regarded the realisation of further utilisation of the USPNet by developing the ICT Centre in this project.

It was confirmed that this project was consistent with Fiji's development plans and needs during the planning and ex-post evaluation, as well as Japan's ODA policy at the time of planning. In addition, project planning and approach were considered as appropriate.

In light of the above, the relevance of this project is high.

3.2 Efficiency (Rating: ①)

3.2.1 Project Outputs

In this project, ICT-related Building A (Common Areas / IT Service Division), Building B (Department of Computer Science / Department of Engineering) and Multi-purpose Theatre were planned to be constructed on the existing premises, and necessary equipment was planned to be procured. The planned and actual project components are as shown in Table 2 and Table 3

Table 2: Planned and Actual Contents of the Facilities Developed in This Project

Building name (Structure / No. of floors)	Area	Principal facility contents
Building A (RC structure, 4 floors)	Plan and Actual: 2,602m^2	Common area IT Service Division Department of Computer Science
Building B (RC structure, 3 floors)	Plan and Actual: 2,810m^2	Department of Computer Science Department of Engineering Research and Development Section Connecting bridges
Multi-purpose Theatre (RC+S structure, 3 floors)	Plan: 1,247m^2 Actual: 1,250m^2	Multi-purpose Theatre Foyer
TOTAL	Plan: 6,659m^2 Actual: 6,662m^2	

Source: Implementation Review Study Report, JICA Internal Document

Table 3: Planned and Actual Contents of the Actual Equipment Procured in This Project

Target field	Name Equipment
Common-use equipment	LCD projector (large) Remote-controlled TV camera Audio system for Multi-purpose theatre Video system for Multi-purpose theatre Audio-visual system for video-conferencing room Audio-visual system for conference room
Department of Computer Science	Server / rack set Personal computers
IT Service Division	Servers (advanced type, ordinary type) Tape backup system Uninterruptible power supply unit Equipment rack Personal computers System for USPNet control room
Department of Engineering	Analogue communications practice system Antenna technology practice system Micro-wave technology practice system Digital communications practice system Server / rack set

Source: Implementation Review Study Report, JICA Internal Document

It was confirmed that the facilities and equipment of this project were constructed and procured almost as planned and that major equipment was all utilized during the site survey of the ex-post evaluation. No facilities or equipment with troubles were observed. Among the major equipment, as more than five years had passed since the personal computers were procured in this project, they were gradually being replaced with USP's own budget.

Computer Room

Inside the Multi-purpose Theatre

In addition to the items developed by Japan, the Fiji government and USP were expected to undertake some work such as ground levelling of the construction site, laying of equipment necessary for power and water supply into the construction site and processing of tax-exemption arrangement. According to USP and the consultant of this project, these items were all implemented by the Fijian side. At the time of ex-post evaluation, no negative influences of implementing these items on the generation of project effects were observed, and it can be said that there were no problems as a whole.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The approximate cost of this project to be borne by Japan was planned to be 2,276 million yen (75 million yen for the detailed survey and 2,201 million yen for the construction), with another 205 million yen planned as implementation expenses to be borne by Fiji.

Table 4 summarises the actual costs contributed by Japan.

Table 4: Actual Project Costs

(Unit: million yen)

		Phase 1	Phase 2	Total
Construction	Direct construction	1,385.0	512.3	1,897.3
	Other construction	518.0	227.6	745.6
Equipment	LOT1	37.0	31.0	190.6
	LOT2	122.6		
Design and supervision		77.6	84.8	162.5
TOTAL		2,140.2	855.8	2,996.0

Source: Prepared from JICA's internal document

As the project cost borne by Japan significantly exceeded the cost expected at the time of planning due to the hike in construction costs following a surge in worldwide

material prices after the implementation review study was conducted, the construction of the Multi-purpose Theatre was excluded during the detailed design stage, which was implemented in the second phase of the project by re-signing the Exchange of Notes. The comparison to the plan shows that the actual cost was a total of 3,071 million yen (75 million yen for the detailed study and 2,996 million yen for the construction), which exceeded the plan (135% of the plan).

On the other hand, the cost borne by Fiji could not be obtained accurately since the expenditure data specific to this project had not been sorted out and stored. Consequently, the evaluation of the project cost was based on the comparison of the Japanese portion.

3.2.2.2 Project Period

The period of this project was expected to be a total of 25 months (February, 2008 – February, 2010), including a detailed design and tender period of 7 months and a construction and procurement period of 18 months. The actual period was 44 months from February, 2008 to September, 2011, which exceeded the planned period substantially. It was caused by the re-signing of the Exchange of Notes after the construction of the Multi-purpose Theatre was separated as the second phase due to the significant increase in project cost, as described earlier. As a consequence, this project was divided into 'The Project for Construction of Information and Communication Technology Center at the University of the South Pacific' in which Building A and B (including the bridging corridor) were developed and 'The Project for Construction of Information and Communication Technology Center at the University of the South Pacific (Phase 2)' in which the Multi-purpose Theatre was constructed[4].

The project period significantly exceeded the plan by 76%. However, it can be highly evaluated that the construction of Building A and B under the budget constraint, which would have had direct influences on actual lectures and practices, was prioritised so that project effects would be generated sooner.

In light of the above, the outputs of this project were mostly as planned, but the project cost exceeded the plan due to increasing in material prices and the project period significantly exceeded the plan. Therefore, the efficiency of the project is low.

[4] The implementation review study was not conducted for Phase 2, and the initial detailed design contents were followed.

3.3 Effectiveness[5] (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

By implementing this project, it was expected as operation indicators that the number of ICT-related curricula, possible hours of ICT-related courses for adults, number of countries that were be connected simultaneously among large classrooms would increase. It was also expected as effect indicators that the number of graduates from the Department of Computer Science and the number of employment in ICT-related jobs would be increased.

Table 5: Operation and Effect Indicators of This Project

Indicator		Baseline	Target	Actual				
				2010	2011	2012	2013	2014
		Baseline Year	2 Years After Completion	Before Completion	Completion Year	1 Year After Completion	2 Years After Completion	3 Years After Completion
Operation Indicators	Number of ICT-related curricula	49/year (2004)	88/year	70/year	80/year	85/year	90/year	90/year
	Possible hours of ICT-related courses for adults	24/week (2004)	48/week	40/week	60/week	60/week	60/week	60/week
	Number of countries that can be connected simultaneously between large classrooms	3 countries (2006)	6 countries	12 countries	12 countries	12 countries	12 countries	12 countries
Effect Indicators	Number of graduates from the Dept. of Computer Science	90 (2006)	Increase	115	100	109	127	-
	Number of employment in ICT-related jobs	97 (2004)	Increase	No data				

Source: Data provided by USP

Note 1: The Building A and B opened in April 2010 and the Multi-purpose Theatre opened in September 2011 at the ICT Centre. In the above table, 2011 was indicated as the completion year as the entire project was completed in that year.

Note 2: As the Department of Computer Science was reorganised into various programmes, it was difficult to make a direct comparison. In the above table, the number of awardees in the programmes related to the ICT Centre was re-sorted and indicated to enable comparisons. The 2014 data had not been made available at the time of ex-post evaluation.

The target year for each indicator set at the time of planning was regarded as 2013, two years after 2011 when data for the full academic year could be obtained after the project was completed in 2010. According to the data provided by USP, it was confirmed that all operation indicators achieved their planned target figures set during the planning stage and that the effect indicator regarding the number of graduates also achieved its target. With respect to the number of counties that can be connected simultaneously between large classrooms, all USP campuses became able to be

[5] Sub-rating for Effectiveness is to be put with consideration of Impact.

simultaneously connected right after the completion of the Phase 1 since the communication system was upgraded together with the implementation of this project.

Among the effect indicators, the number of employment of graduates in ICT-related jobs could not be obtained quantitatively as USP had not conducted sufficient surveys. However, interviews with the ICT Centre staff as well as the graduates in Fiji and Tonga revealed that the graduates from the Department of Computer Science and Information Science are highly sought after in the job market and the supply was always short. While the data were not accurate, at least over 90% of the students secured their employment at the time of their graduation, according to the ICT Centre. Therefore, it can be judged that this indicator has also been achieved.

3.3.2 Qualitative Effects (Other Effects)

At the time of planning, it was expected that the following qualitative effects would be generated by implementing this project.

1) Provisions of efficient and effective classes to USP students will become possible.
2) The Multi-purpose Theatre will be utilised in various occasions (e.g. for international conferences), not just internally within the university, which will promote cooperation among industries, academia, and the government in and outside the region.
3) Servers and their installation environment in the IT Service Division will be improved and reliability of network environment within the campus will be higher.
4) The Research and Development Department conducting joint research and development with external organisations will be upgraded and strengthened.

With regard to 1), it was observed from the interviews in Fiji and Tonga with graduates who majored in ICT that the improvement of facilities and equipment enabled efficient and effective lectures and practices. In a beneficiary survey[6] with students, 90% of them replied in the same way that effective and efficient lectures and practices had been realised. It can be considered that this effect has been achieved as a whole.

Regarding 2) the Multi-purpose Theatre, it became clear that the theatre was used by a total of 57 groups, when the status of utilisation between January and October 2014 was counted during the ex-post evaluation (1 – 9 days each time). Since the theatre is positioned as a high-quality facility equipped with audio equipment, it has not been used

[6] A questionnaire survey was conducted with 100 students currently studying at the School of Computing, Information and Mathematical Sciences. The survey concerned the level of satisfaction with the facilities and equipment at the ICT Centre, the Internet environment, efficiency and effectiveness of classes utilising ICT, etc.

for lectures for students so as to maintain the facility in best conditions. It was not necessarily intended to increase the number of days used and the theatre has been used for international academic conferences, music concerts, cultural events, seminars, etc. It was heard from USP's Oceania Centre, a most frequent user, and other university staff that the quality of various events improved significantly compared to the past by using the Multi-purpose Theatre, and the theatre was being utilised as a facility to promote cooperation and interaction within and between the regions.

As for 3), servers were upgraded in this project, and the USPNet, connecting USP with other campuses, also became stable. In addition, servers were strengthened further by USP and communications using optic fibre cables have become possible with Marshall Islands and Tonga. The ICT Centre is seen as a facility underpinning the significant improvement of communication environment. With these upgrades, a network use limit imposed on USP students (a system in which excessive communication traffic would be charged) was abolished, making it possible for current students to use the network environment without limitation.

With respect to 4), it was confirmed that the Research Office was established at USP, which created a high performance computing unit to start promoting better access to super computers at other universities and various simulation researches by utilising the functions of the ICT Centre. At the time of ex-post evaluation, no major collaborative projects with companies within the country or region were observed and the advancement of researches utilising ICT was still at its initial stage. As the ICT environment improved through this project, international researches are expected to be progressed.

Based on the above, it can be evaluated that the qualitative effects 1) – 4) expected at the time of planning have sufficiently been achieved after this project was implemented.

3.4 Impacts

3.4.1 Intended Impacts

At the time of project planning, the following points were expected as the impacts of project implementation.

1) Human resources with ICT skills will be supplied so that the Pacific island nations will be able to take part in a global information society easily.
2) A new department of information engineering will be established to supply engineers that are lacking in the Pacific region.
3) As USP is the top tertiary educational institute in the Pacific, established by 12 member countries, the effect of this project will prevail in Fiji and throughout the

Pacific.

USP is the only regional tertiary institute in the Pacific and many of the ICT technicians in the government and private sectors in each Pacific island countries are likely to be the USP graduates. Along with the widespread use of the Internet and mobile networks in recent years, demand for ICT experts has been very high. In the interviews with the graduates with ICT major, it was heard that the majority of graduates find it easier to find jobs than the graduates from other schools, and they are working in the sectors related to ICT. The demand has been felt by students, as shown in the beneficiary survey that approximately half (49%) of the current students with ICT major consider that they have more job opportunities than students in other schools. Therefore, it is assumed that this project played a great role in terms of the production of human resources to respond to the information society.

After this project was implemented, no programme with the name of Information Engineering was established, but it was confirmed that various human resources with ICT skills were being developed at the ICT Centre by newly establishing the Netcentric and Software Engineering programmes.

Moreover, the 'ICT for Human Development and Human Security Project' was implemented for three years from 2010, as JICA's technical cooperation project to develop capacities on ICT education. In this project, one of the outputs to be achieved was 'Operational policy and services of the Japan-Pacific ICT Centre are established'. While a section in charge of operation and management of the ICT Centre was established and guidelines on the use of Multipurpose Theatre facilities were formulated, incubation space cannot be said to have been fully utilised as each room was smaller than what was needed by private companies. Formulation of the operational policy of the ICT Centre itself was yet to be completed. While it is desirable to consider countermeasures to the underutilised incubation space, the ICT Centre has been adequately operated and maintained by the IT Service Division as described later, and no major problems have occurred in practice.

Based on the above, it can be judged that the overall impacts of this project have been generated in terms of the contribution to the supply of ICT experts and the information society in the entire Pacific region.

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

At the time of planning, it was considered that this project would not cause any undesirable impact on the natural environment as this project was to be implemented

within the existing premises. Under the Environment Management Act of Fiji, it was not obliged to conduct an environmental impact assessment of this project.

When environmental impacts were checked with USP during the ex-post evaluation study, no negative impacts on the natural environment were observed during and after the project, and no particular instructions were given by the ministry in charge of environment. Comments from the project consultant were also obtained that there were no particular environmental impacts caused by this project.

Based on the above, it can be said that there were no problems, since no negative environmental impacts were caused as initially expected.

3.4.2.2 Land Acquisition and Resettlement

At the time of planning, neither resident resettlement nor land acquisition was expected as the components of this project were to construct facilities and procure equipment within the existing premises. It was confirmed at the time of ex-post evaluation that there were no problems as all the facilities were constructed within the existing premises and no resident resettlement or land acquisition was identified.

With regard to the indicators expected at the time of planning of this project, while the quantitative data on the number of employment in ICT-related jobs could not be obtained, target figures were achieved as a whole, and qualitative effects were observed in terms of the improvement of lectures and practices, utilisation of newly constructed Multi-purpose Theatre and commencement of international researches. Concerning the impact, it was seen that the ICT Centre was making a great contribution to the development and supply of human resources with ICT skills in the region. It was also confirmed that no negative impacts on the natural environment, resident resettlement or land acquisition were generated.

In light of the above, this project largely achieved its objectives; therefore, the effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ③)

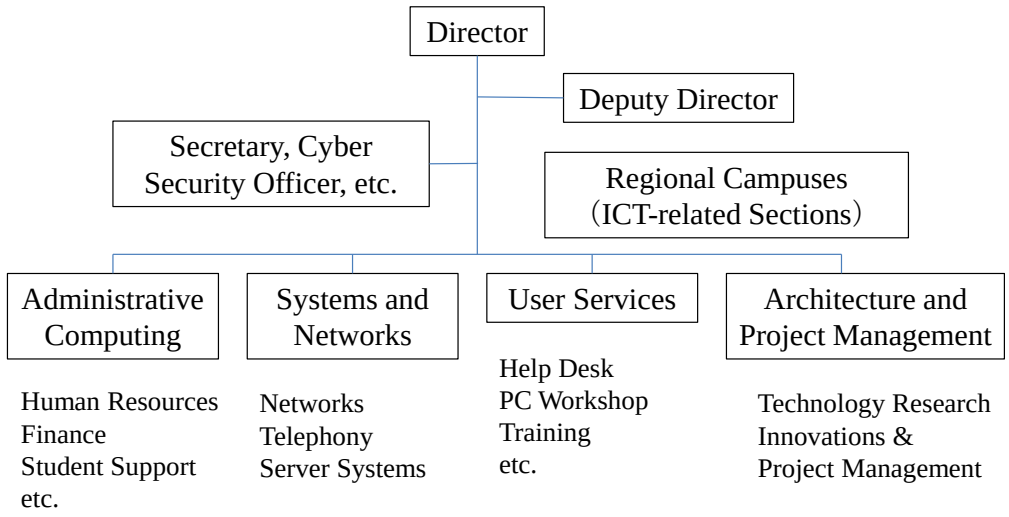
3.5.1 Institutional Aspects of Operation and Maintenance

USP, the implementing agency, is a regional tertiary education institute (university) in the Pacific with a total of 24,986 students[7] and 1,584 staff members. In addition to the main campus in Suva, it has a total of 14 campuses including those in 12 member countries.

[7] This figure is the head count, and the full-time equivalent number is 13,648.

The ICT Centre is positioned under the Vice President and its operation and maintenance is undertaken by the IT Service Division (hereinafter referred to as 'ITS'). Under the Director, ITS has four managers in charge of user services, systems and networks, etc. It has a total of 86 staff and allocates 15 student interns at the Helpdesk.

According to ITS, the structure has been strengthened by increasing staff numbers as needed after this project was implemented, and there were no issues in terms of the institutional aspect of operation and maintenance of facilities and equipment. At the time of ex-post evaluation, actual operation and maintenance status did not indicate any particular concerns on the number of staff and the organisational structure.



Source: Prepared Based on the Information Provided by USP

Figure 1: Structure of Information Technology Services (Simplified Version)

3.5.2 Technical Aspects of Operation and Maintenance

ITS had highly skilled technicians from the planning period of this project and they were judged to have had sufficient techniques and experiences in developing a intra-campus local area network (LAN), building a server system, maintaining and inspecting the USPNet, etc.

Checked during the ex-post evaluation study, facilities and ICT-related equipment provided in this project were being used without problems, and no concerns were observed in terms of technical aspects on utilising the equipment. According to ITS, staff in charge of operation and maintenance of equipment were likely to be the graduates who studied ICT at USP and had sufficient knowledge in those areas. It was also confirmed that the Director and other managers all had related academic qualifications higher than master's degrees, with over 20 years of working experiences.

As for training, capacity development efforts were being made by providing training

on network technologies to all staff members within the campus, and also higher-level training to engineers on an irregular basis.

3.5.3 Financial Aspects of Operation and Maintenance

USP is a regional tertiary education institute in the Pacific, and subsidies from each government were the major source of revenue. However, while the subsidies from each government have grown at a sluggish pace, revenues from tuition fees, foreign aid and other revenues have been increasing. Due to the increase in student numbers and payroll costs, various expenses for university operations also increased simultaneously, but management with a favourable balance has basically been secured. In 2013, a temporary deficit was posted as losses were registered due to the change in the accounting method to be in line with the international accounting standards regarding the treatment of donated asset. However, it bounced back to a surplus again in the first half of 2014. It is considered that there are no problems as a whole.

The financial conditions of USP in recent years are shown in Table 6.

Table 6: Financial Balance of the Entire USP

(Unit: 1,000 Fijian Dollar)

	2011	2012	2013	2014
Revenue	**144,158**	**164,532**	**172,249**	**92,761**
Government subsidy	47,946	47,946	47,946	24,782
Tuition fees, etc.	35,439	37,379	39,265	24,183
Foreign aid	32,254	45,846	51,083	26,142
Other revenues	28,518	33,360	33,954	17,653
Expenditure	**137,913**	**157,086**	**174,004**	**85,800**
Compensation to faculties	60,792	65,869	76,739	38,156
Management support	1,904	1,856	2,107	1,141
Utilities, land-related and maintenance expenses	6,939	7,947	10,173	4,792
Communications cost	3,421	3,960	4,331	2,500
General education expenses	3,463	5,105	4,220	2,637
Other expenses	54,714	63,074	66,997	31,337
Reserve fund	6,680	9,275	9,437	5,237
Balance	**6,245**	**7,446**	**-1,755**	**6,961**

Source: Data provided by USP

Note: Figures for 2014 are for the first 6 months (January –June) only.

The recent operation and maintenance budget of ITS, in charge of operation and maintenance of the ICT Centre, is shown in Table 7 (payroll costs excluded).

Table 7: Operation and Maintenance Budget of ITS

(Unit: 1,000 Fijian Dollar)

	2012	2013	2014
Internet Lease Line Charges	960.0	1,100.8	1,100.8
Satellite Lease	1,540.3	1,978.9	2,000.0
Software Licenses	977.9	875.3	1,616.6
Other Operation and Maintenance Costs	487.8	488.0	832.7
TOTAL	3,966.0	4,443.0	5,550.1

Source: Data provide by USP

While much of ITS budget is being directed to lease charges and license costs, other operation and maintenance expenses have also increased in recent years. Along with the enhancement of communication environment, overall operation and maintenance expenses have been increasing, but it is a result of the enhancement in line with the university's management direction and no comments were heard that the budget was insufficient. It is considered that a sufficient amount has been allocated.

Since the communication environment was not adequate at the time of project planning, it was planned in 2007 to achieve a sound financial balance by developing and operating a system in which an upper limit of students' Internet usage was set and the excess charges needed to be paid when the usage exceeded the limit. This system was actually implemented. After the Internet line was augmented, there is no more need to set a limit on the usage by students, and no excess charges are collected.

Based on the above, it can be judged that there are no problems in the financial status of the entire university and the budget for operation and maintenance of the ICT Centre.

3.5.4 Current Status of Operation and Maintenance

During the field visit in the ex-post evaluation, all the facilities and equipment developed were generally used. As described above, it was confirmed that appropriate maintenance of facilities and equipment had been conducted in line with the replacement plan, as seen in the case of PCs being replaced after five years had passed. Various manuals were sorted and stored in the Director's office, which were ready to be referred to when necessary.

As for the procurement of spare parts for ICT-related equipment, no problems were identified in terms of the procurement routes or budget constraints. There was no major equipment broken down and unused. When breakdowns occur, internal staff undertakes repairs and there were no particular issues seen during the field visit in the ex-post evaluation.

In light of the above, no major problems have been observed in the institutional, technical and financial aspects of the operation and maintenance system. Therefore, the sustainability of the project effects is high.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

In this project, ICT / distance education facilities and a research and development environment were developed at the USP to improve ICT education and training functions and human resource development functions in the ICT sector in the Pacific region. This project was consistent with the development plan and needs of Fiji and the entire Pacific region, as well as the priority areas of Japan's ODA policy. Therefore, the relevance of this project is high. With regard to project implementation, while the project components were implemented mostly as planned, the project cost exceeded the plan due to a surge in construction costs, associated with a substantial extension of the project period. Consequently, the efficiency was judged to be low. With respect to project effectiveness, quantitative targets expected at the time of planning were achieved as a whole, and other qualitative effects, such as an improvement in lectures and actual practices, utilisation of newly constructed Multi-purpose Theatre and commencement of international research projects, were also observed. It was confirmed as an impact that the ICT Centre made significant contributions to the development and production of ICT professionals in the region. Therefore, the effectiveness and impact of this project is high. In terms of sustainability, no particular issues were identified in institutional, technical and financial aspects as well as the current status of operation and maintenance, meaning that the sustainability of the effects of this project is considered to be high.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

<u>Development of Information on Job Placement and Career Path of Graduates</u>

In this study, it was uniformly heard in the interviews with those who were concerned with this project that the ICT Centre was making a great contribution to the development of human resources with ICT skills in the region, and it was observed that the demand for ICT experts was also high across the region. However, no comprehensive survey on the carrier path of graduates, which made it difficult to show the effects quantitatively. By conducting a survey on the employment of graduates, it is assumed that a concrete level of contribution of the ICT Centre will become visible and such information will be attractive and useful in recruiting new students. Therefore, it is

desirable that key roles of graduates be regularly captured as quantitatively as possible.

Utilisation of Incubation Facilities

In this ex-post evaluation study, it was confirmed that the incubation space in the ICT Centre was not sufficiently utilised as it was not large enough for private firms. It is considered to be important to formulate a utilisation policy of the space by fully understanding their needs and generate further added-values of the ICT Centre, because USP, positioned as a regional tertiary educational institute in the Pacific, has started an effort to sophisticate research activities by utilising ICT, led by the Research Office, and several firms have shown interests in industry-university collaboration.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Importance of Assistance Plan after Verifying the Effects and Issues of the Past Assistance

Japan had provided a long-term assistance to ICT education at USP, and contributed to the realisation and enhancement of higher education not only in Fiji, where the headquarters of USP is located, but also in each member country in the Pacific region. This project was implemented against that background. Therefore, at the time of planning of this project, it is assumed that a plan on the development of ICT education at USP, a tertiary education and research institute of the entire region, and a capacity of USP in properly undertaking operation and maintenance when facilities and equipment were developed, were already captured.. It is considered that this relatively large investment project was planned by understanding these directions and capacities to solve the problem that the education environment (facilities and equipment) conducive to the development of ICT experts required by each member country in the higher education sector in the Pacific region was inadequate. Therefore, when a new project is planned for an implementing agency with the past assistance record, it is considered to be important for JICA to verify the effectiveness, impact and sustainability of the previous assistance to consider the optimal size of the new project, effective components and appropriate methods in implementing the project.

(End)

Islamic Republic of Pakistan

Ex-Post Evaluation of Technical Cooperation Project

"The Project for Establishment of Environmental Monitoring System"

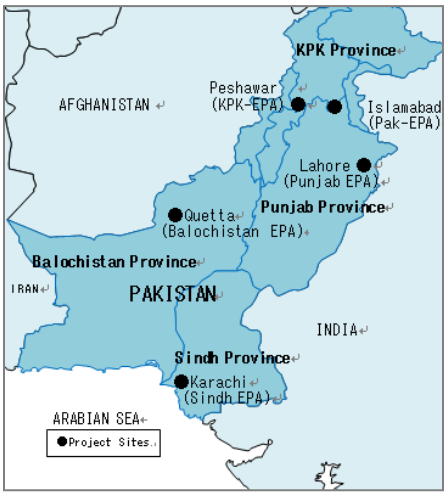
External Evaluator: Hisae Takahashi, Ernst & Young Sustainability Co., Ltd.

0. Summary

This project was conducted with the aim of enhancing the capacity of the Federal (Pak) - EPA and the Provincial EPAs to conduct environmental monitoring on air and water in Pakistan. The purpose of this project was consistent with Pakistan's development policy and needs, which prioritized the environmental protection due to the issue of increasing the pollution, as well as Japanese assistance policy. Thus, its relevance is high. Thanks to the project, Pak-EPA and Provincial EPAs now have enhanced capacities to formulate monitoring plans and are capable of collecting and analyzing data based on a uniform Standard of Procedure which was not existed before the project. A Quality Assurance and Quality Control (QA/QC) system for laboratory activities was introduced in the process, and the capacity to analyze and evaluate data in line with internationally recognized standards was gained. On the other hand, the budget allocation and staff recruitment process were both changed drastically as a consequence of the devolution of the ministries responsible for environment from the Federal to Provincial government. Due to these changes, major monitoring activities were limited at some of the EPAs where budget for monitoring activities was not secured. While the environmental monitoring system was developed, these limitations in monitoring have prevented the system from reaching full functionality in practice. Thus, the effectiveness and impact of the project are fair. While the project period was within the plan, the project cost exceed the plan, thus its efficiency is fair. As for sustainability, coordination among the EPAs was sometimes lacking, and low retention rate of staff employed by the project in terms of institutional aspect as well as expensive maintenance cost and spare parts and consumable cost in terms of financial aspect were raised as EPA's concerns. Thus its sustainability is fair.

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

1. Project Description



Project Locations

(Upper Left)
Fixed Air Monitoring Station

(Bottom Right)
EPA Staff Conducting Monitoring Activities at a Fixed Air Monitoring Station (Punjab EPA)

1.1 Background

In Islamic Republic of Pakistan (Pakistan), air and water pollution were on the rise due to automobile emissions as well as wastewater discharge from domestic and industrial sources. For instances, according to the survey conducted by JICA in 2000, the concentration of pollutants exceeded the Japanese or the World Health Organization (WHO) environmental standards by 20-90%. Concern was growing over the emission of particulate matters in the atmospheres, seepage of wastewater into aquifers, and adverse health effects on population.

However, the country had not established environmental standards that suited its conditions, and laws and regulations on pollution control were not being fully enforced, primarily, due to non-existence of environmental monitoring network and lack of personnel. These issues were addressed for appropriate environmental administration. Given these situations, Japanese Government supported the grant aid project, "The Establishment of Environmental Monitoring System (EMS Project)", in 2006 with the aim of establishing the basis of a permanent nationwide environmental monitoring system in Pakistan. Under the EMS project, a Central Laboratory for Environmental Analysis and Networking was built and equipment for air quality monitoring and analysis equipment for laboratories were installed. This technical cooperation project started aiming at enhancing the technical capacity of EPAs in air and water quality monitoring with the utilization of facilities and equipment provided under the EMS project.

1.2 Project Outline

Overall Goal		Environmental monitoring systems are in place at Pak-EPA and Provincial EPAs.
Project Purpose		Pak-EPA's and Provincial EPA's capacity of environmental monitoring on air and water is enhanced.
Outputs	Output 1	Pak-EPA and Provincial EPAs are capable of formulating Environmental monitoring plans.
	Output 2	Pak-EPA and Provincial EPAs are capable of measuring the major parameters of National Environmental Quality Standards (NEQS) based on uniform methodologies of sampling measurements and analysis.
	Output 3	Laboratory Management System is improved and QA/QC system is established at Pak-EPA and Provincial EPAs.
	Output 4	Pak-EPA and Provincial EPAs are capable of interpreting and evaluating monitoring data based on the internationally recognized environmental standards/ NEQS
	Output 5	Based on the Environment Monitoring Information System (EMIS), Pak-EPA and Provincial EPAs are capable of compiling monitoring data and disseminating to the public.
Total cost (Japanese Side)		450 million yen
Period of Cooperation		February, 2009 – February, 2012
Implementing Agency		Pakistan Environmental Protection Agency (Pak-EPA), Punjab-EPA, Sindh-EPA, Khyber Pakhtun Khwa-EPA and Balochistan-EPA
Other Relevant Agencies / Organizations		-
Supporting Agency/Organization in Japan		-
Related Projects		The Project for the Establishment of Environmental Monitoring System (Grant Aid completed in 2006)

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of Project Purpose at the time of the Terminal Evaluation

The capacity of technical staff at each EPA in conducting environmental monitoring activities was improved in relative terms. The knowledge and skills of the EPAs in air and water quality monitoring was also enhanced. Thus, the project purpose was deemed to be achieved. However, the capacity enhancement of the EPAs was only in relative terms. The knowledge and skills of EPA staff should be further enhanced in order to effectively conduct environmental monitoring.

1.3.2 Achievement Status of Overall Goal at the time of the Terminal Evaluation

It was reported that the overall goal will be achieved if financial arrangements for monitoring are duly completed and the technical staff persons with enhanced capacity remain. At the time of terminal evaluation, the overall goal appeared most likely to be achieved at the two EPAs where budget was confirmed. The other EPAs, meanwhile, were still in the process of securing the budget and technical staff. There were prospects that the overall goal would be achieved if they succeeded in securing them.

1.3.3 Recommendations at the time of the Terminal Evaluation

Recommendations for after the project completion were raised as follows.

1) The EPAs were requested to go through the process for securing and executing the budget for monitoring activities and to regularize the project staff who enhanced the monitoring capacity through the project. So that the project effect will continue sustainably.
2) EPAs were expected to have periodical follow up meetings for sharing the progress of securing the budget as well as regularization of the project staff for environmental monitoring.
3) Pak-EPA and each provincial EPA were recommended to coordinate themselves to develop a system in which monitoring data are shared among all of them.
4) Respective EPAs were requested to develop a mechanism to share technical information among their staff in each EPA.

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Ernst & Young Sustainability Co., Ltd

2.2 Duration of Evaluation Study

Duration of the Study: August, 2014 – July, 2015

Duration of the Field Study: October 25 – November 7, 2014,
February 25 –March 7, 2015

2.3 Constraints during the Evaluation Study

For security reasons, site visits by external evaluators to two of the five target EPAs, namely, Khyber Pakhtunkhwa (KPK)-EPA and Balochistan-EPA, were not conducted. The surveys for collecting necessary information for evaluation of those two EPAs were conducted by questionnaires and interviews with EPA staff member in Islamabad or Karachi.

3. Results of the Evaluation (Overall Rating: C[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance to the Development Plan of Pakistan

"The Ten Year Development Plan (2001)", Pakistan's Development Policy at the time of ex-ante evaluation, positioned the environmental sector as a priority area, listed a goal consisting of twelve items, and summarized the degree of achievement of each item. "Mid Term Development Framework (MTDF) (2005-2010)" announced as a mid-term development goal aimed at satisfying both environmental protection and economic growth and emphasized the importance of the environmental sector by listing a target goal consisting of fifteen items. In 2001, Pakistan formulated a "National Environmental Action plan (NEAP)" aimed at strengthening actions for protecting public sanitation policy, promoting sustainable living environments, improving the environment for people's living, and supporting measures for poverty eradication. In 2005, Pakistan also formulated a "National Environmental Policy" providing guidelines on efficient environmental management and engagements in environmental issues for the federal government, provincial governments, capital territory, and local governments. In this way, Pakistan took a step forward at the time of the ex-ante evaluation by mapping out a series of environmental sector strategies to respond to increasing environmental pollution.

"The 10th Five Year Development Plan (2010-2015) Approach Paper" issued after the MTDF also introduced "Environmental conservation and countermeasures for climate change" as one of 14 its pillars. The plan prioritized the strategies for the environmental sector and specified needs linked to the provision of safe water and appropriate public health, institutional capacity building, and knowledge management in the environmental sector. The plan proposed a concrete strategy, including the establishment of an effective monitoring system and the formulation and execution of national environmental standards on air and water. NEAP, the National Environmental Plan, and other policy initiatives shown at the time of ex-ante evaluation were still in effect at the time of project completion.

As mentioned above, development policy in Pakistan consistently assigned the environment sector to an important position in both project planning and completion stages by emphasizing the importance of countermeasures for environmental conservation and climate change towards the realization of sustainable development. Thus, this project, an initiative aimed at strengthening Pakistan's environmental

[1] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[2] ③: High, ② Fair, ① Low

monitoring capacity for air and water through monitoring activities based on the national standard at Pak-EPA and the Provincial EPAs, is consistent with the development policies of Pakistan.

3.1.2 Relevance to the Development Needs of Pakistan

In Pakistan, air and water pollution is accelerated by the increase in population and the effect of automobile emissions as well as wastewater discharge from domestic and industrial sources. As of the ex-ante evaluation, lack of nationwide environmental monitoring networks and personnel were issues for proper environmental administration. Given these situations, the Japanese Government supported the "EMS Project," a grant aid project to establish a nationwide environmental monitoring system in Pakistan by building a laboratory and installing monitoring equipment. Yet technical assistance was required for the more effective use of the laboratory and equipment as of that time, as the monitoring and analysis capacities of Pak-EPA and the Provincial EPAs were still insufficient. Though specific data were not available at the time of project completion, air and water pollution still posed serious health risks and were designated as issues to be addressed in the future[3]. It is therefore important to understand the status of air and water pollution in Pakistan and establish a nationwide environmental monitoring system for tackling both at the ex-ante evaluation and project completion. As such, this project was consistent with Pakistan's development needs.

3.1.3 Relevance to Japan's ODA Policy

"The Japanese Country Assistance Strategy for Pakistan (2005)" placed the overall goal as "establishment and development of sustainable society" and listed the environmental sector as important cross-cutting issues. "Japanese ODA Charter (2003)" also showed sustainable development and environmental issues as important agendas.

3.1.4 Adequacy of Project Planning and Approach

In 2011, while the project was underway, the government of Pakistan decided to devolve some of its administration functions to provincial governments under the 18th amendment to the Constitution. Accordingly, the Ministry of Environment was dissolved in June 2011 and the responsibility for environmental administration was transferred to each Province. Project activities were not affected by this change but the budget allocation process of the Pakistan side was modified. The budget for the project activities initially released was based on the budget of the Ministry of Environment. After the responsibility for environmental administration devolved, each Provincial EPA

[3] Source: Pakistan Economy Survey 2013-14

was required to formulate and submit a budget report to its Provincial Government. The Provincial Government, in turn, authorized and allocated the budget. This modification affected the project cost covered by the Pakistan side and sustainability related for securing budget and staff after the project completion. However, this devolution was not assumed at all at the time of project planning and designing the project framework considered this was clearly seen as impossible as of the planning. Therefore, it can be judged that the project design was adequate at the project planning stage.

As stated above, this project has been highly relevant to Pakistan's development plan, which prioritizes environmental conservation and development needs for establishing a nationwide monitoring system to clearly grasp the state of pollution, and also to Japan's ODA policy, which positioned the environmental sector as a priority area. Therefore its relevance is high.

3.2 Effectiveness and Impact[4] (Rating: ②)

3.2.1 Effectiveness

3.2.1.1 Achievement of Project Purpose

Project Purpose:

Pak-EPA's and Provincial EPA's capacity of environmental monitoring on air and water is enhanced.

This project was composed five outputs: Pak-EPA and the Provincial EPAs are capable of formulating environmental monitoring plans (Output 1); the EPAs are capable of measuring parameters on air and water based on uniform methodologies for sampling measurements and analysis (Output 2); a laboratory management and QA/QC system in line with improved manuals and guidelines is established (Output 3); based on Outputs 1 to 3, the EPAs are capable of interpreting and evaluating monitoring data based on the internationally recognized environmental standards/NEQS (Output 4); and the EPAs are capable of compiling monitoring data and disseminating them to the Public (Output 5). The project purpose, namely, to enhance the capacity of Pak-EPA and the Provincial EPA to conduct environmental monitoring on air and water, is therefore attained (See Figure 1).

[4] Sub-rating for Effectiveness is to be put with consideration of Impact.

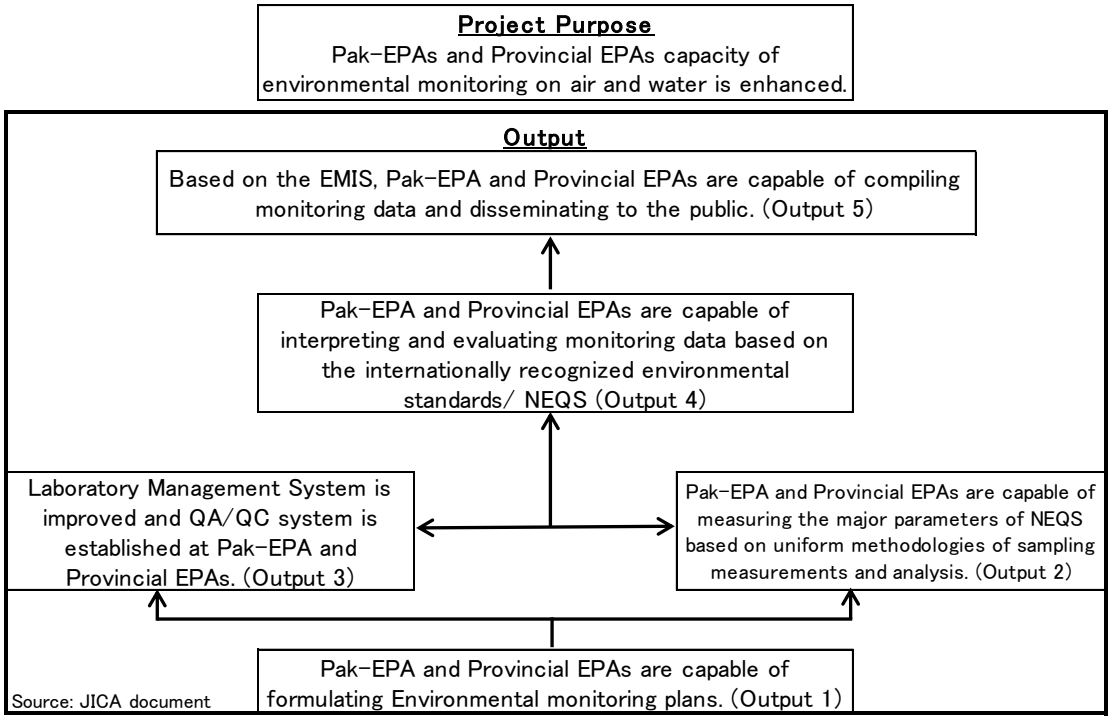


Figure 1 Output and Project Purpose

Table 1 lists the indicators of the project purpose and the achievement of each indicator as of the project completion.

Table 1 Achievement of Indicators for the Project Purpose

	Indicator[5]	Achievement of Indicator
Project Purpose	Indicator① Environmental monitoring reports including the interpretation and evaluation of the water and ambient air quality in the pilot areas are published by Pak-EPA and at least one of the provincial EPAs.	Indicator①：Achieved Water: Pak-EPA and the four Provincial EPAs developed water quality monitoring reports. Air : Pak-EPA and four Provincial EPAs developed air quality monitoring reports.
	Indicator② The monitoring results with appropriated significant digits required for NEQS are obtained by Pak-EPA.	Indicator② : Largely achieved In Pak-EPA and the four Provincial EPAs: Water: A certain level of significant digits were obtained, as a result. Air : A certain level of significant digits were obtained for half of the analytical equipment, as a result.
	Indicator③ QA/QC system in Pak-EPA and	Indicator③ : Achieved Each EPA conducted its activities in line

[5] At the time of the ex-ante evaluation, each indicator was targeted for each EPA. The Japanese Experts, however, were banned from visiting KPK and Balochistan EPAs after the project commenced due to the security reasons. The indicators for the EPAs were therefore modified to make them feasible. The changes are judged to have been reasonable under such circumstances.

	at least one of the provincial EPAs are initiated through development of regulation(s) and manual(s).	with the developed QA/QC system (including the developed manuals).

Source: Prepared based on the documents provided by JICA

Through the project activities, the capacity of Pak-EPA and the Provincial EPAs to environmentally monitor air and water largely improved. Before the project, the EPAs had no guidelines or manuals to follow. As such, they monitored different items within a scope of limited parameters that differed every time. Thanks to the project activities, the EPAs were able to measure and analyze data based on uniform rules and standards according to Standard Operation Procedures and managed to develop a monitoring report on air and water quality during the project period. The knowledge and experience gained helped to strengthen the capacity of the EPAs to implement monitoring activities. According to the documents provided by JICA, the general level of understanding among the trainees improved at the following rates after the project training courses were completed:

・Proficiency rating for air monitoring: Average 18%→34%[6]

・Rating of the staff's capacity for water monitoring : 2.3→3.9 (5 point scale)

The interview survey conducted in the terminal evaluation also confirmed that the EPA staff members interviewed recognized the enhanced capacity gained by the EPA technical staff during the project. At the same time, it was also mentioned that the level of staff knowledge and skills should be further enhanced to enable them to perform effective environmental monitoring by themselves.

3.2.1.2 Project Output

As shown in Figure 1, the expected outputs required for the achievement of the project's purpose were largely achieved at the time of project completion. Table 2 summarizes the achievements of each indicator set for each output.

Output 1 "Pak-EPA and provincial EPAs are capable of formulating environmental monitoring plans."

Through training and monitoring activities in practice, a guideline for overall environmental monitoring plan was prepared. Based on the guideline, all EPAs formulated environmental monitoring plans in pilot areas for both water and air. This indicates that the system, for formulating the environmental monitoring plans in line

[6] This result shows the level of understanding relative to a full understanding of 100%.

with the uniform guideline, was in place at each EPA.

Output 2 "Pak-EPA and Provincial EPAs are capable of measuring the major parameters of NEQS based on uniform methodologies of sampling measurements and analysis."

Under the project, the project team prepared maintenance management plans and manuals[7] for measuring equipment as well as Standard Operating Procedures which described the procedure of sample collection survey, measurement and analysis. The SOP enabled the EPAs to measure the major parameters in NEQS where they previously utilized a few limited parameters. This means that the EPAs, previously applied basic analysis, can now conduct more advanced measurements and analyses.

Output 3 "Laboratory Management System is improved and QA/QC system is established at Pak-EPA and Provincial EPAs."

Laboratory management manuals were developed utilizing the existing laboratory activities, and the QA/QC system was introduced to the EPAs. The system and manuals were not applied before the project. As such, the introduction of a unified laboratory management system with manuals and a QA/QC system in line with activity plans has helped improve the quality of laboratory activities.

Output 4 "Pak-EPA and Provincial EPAs are capable of interpreting and evaluating monitoring data based on the internationally recognized environmental standards/ NEQS."

As of the project completion, all of the EPAs had collected, interpreted, and evaluated the data by referring to the NEQS. Given that this was not done before the project, the capacity for interpreting and evaluating the monitored data was credibly improved compared to before the project. Environmental management plans in pilot areas were formulated based on the results of the analyses. Through the process of formulating the plan in pilot areas, the technical staff gained experience and improved their capabilities in formulating environmental management plans.

Output 5 "Based on the EMIS, Pak-EPA and Provincial EPAs are capable of compiling monitoring data and disseminating to the public"

By introducing the EMIS system, data of each provincial EPA could be automatically

[7] The monitoring activities under the project were conducted using analytical equipment provided through the EMS project. Since major equipment was inoperable at the start of the project due to a lack of proper maintenance, training in the operation and maintenance of that equipment was required to start the project activities.

transferred to the EMIS of Pak-EPA. This did much to strengthen the data management system of the EPAs in Pakistan. Following this system, necessary data to upgrade the website were prepared at each EPA. Furthermore, a report integrating the monitoring data of each EPA was compiled and opened to the public in libraries. This is considered an important output and was instrumental in the preparation of the report at the country level.

Table 2 Achievement of Output Indicators

Output 1: Pak-EPA and Provincial EPAs are capable of formulating environmental monitoring plans.	
Indicator ① Responsible person(s) for formulating environmental monitoring plan (air/water) are properly selected by Each Provincial EPA.	Achievement Responsible person(s) for formulating environmental monitoring plan were properly selected at each EPA. With the initiative of the responsible person, the plans were formulated.
Indicator ② A guideline of overall environmental monitoring plan is prepared by Pak-EPA.	Achievement Guidelines for environmental monitoring plans were prepared by Pak-EPA.
Indicator ③ Environmental monitoring plans in pilot areas are formulated as follows; (Ambient Air) (Emission (Air)) Pak-EPA, Punjab-EPA and Sindh-EPA. (Ambient Water) (Effluent (water)) All target EPA	Achievement Environmental monitoring plans (ambient air, emission air, ambient water and effluents water) at pilot areas were formulated in all EPAs.
Output 2: Pak-EPA and Provincial EPAs are capable of measuring the major parameters of NEQS based on uniform methodologies of sampling measurements and analysis.	
Indicator ① (Water) SOP for 30 parameters of NEQS / (Air-Ambient) SOP for 8 parameters / (Air-Emission) SOP for 15 particular parameters in NEQS defined by the Expert is developed	Achievement SOPs were developed as follows: SOP for Environmental Water Quality monitoring for all 32 parameters in NEQ SOP for measurement of ambient water for 8 parameters. SOP for measurement of Stationary Emission Gases for 15 parameters in NEQS.
Indicator ② Maintenance plans and manuals of the equipment are formulated and in place in association with Pak, Punjab, Sindh, KP and Balochistan- EPAs	Achievement Maintenance Plan/Manual was formulated which described maintenance/inspection procedures, maintenance plan and counter action and correction for equipment procured by grant aid project.
Indicator ③ Quality control records and log books of analysis are kept as follows; (Air Monitoring Stations) Pak and Punjab -EPA, (Analytical Equipment) Pak, Punjab and Singh-EPAs	Achievement Air monitoring stations: Quality control records were recorded and kept in maintenance sheets at stations at Pak and Punjab EPA though more precise control were needed. Analytical equipment: Use of log book, prepared under the project, started and kept at Pak-EPA, Punjab EPA, Sindh EPA

Indicator ④ (Water) The analytical results of QC samples are put into 20% range of QC sample in Pak, Punjab and Sindh-EPAs. (Air -Ambient) The difference of calibration factors of each air analyzer is less than 4 % at every calibration in Pak, Punjab and Sindh-EPAs. (Air-Emission) The difference of calibration factors of PG250 is less than 4 % in every measurement in Pak, Punjab and Sindh-EPAs.	Achievement Water: Certain accuracy of analysis[8] was secured by the result of the proficiency ratio at Pak, Punjab and Sindh EPAs. Air-Ambient: Calibration test were demonstrated at Pak, Punjab and Sindh-EPAs. Only 50% of air analyzers reached less than 4% in the difference of calibration factors due to the limited number of calibration per analyzer. Air-Emission: On average, 70% of mobile gas analyzer (PG250) reached less than 4% in the difference of calibration factors at Pak, Punjab and Sindh-EPAs.
Output 3: Laboratory Management System is improved and QA/QC system is established at Pak-EPA and Provincial EPAs.	
Indicator ① Laboratory management manual is prepared in each EPA	Achievement Laboratory management manual was prepared by utilizing the existing laboratory activities, 14 operation procedures and manuals.
Indicator ② Responsible person(s) for QA/QC is (are) properly selected on the work process chart by each EPA	Achievement Responsible persons for QA/QC were identified on the work process chart at each EPA, and laboratory management system was improved.
Indicator ③ QA/QC activity plans are prepared in each EPA.	Achievement QA/QC activity plans were prepared in each EPA during the project implementation.
Output 4: Pak-EPA and Provincial EPAs are capable of interpreting and evaluating monitoring data based on the internationally recognized environmental standards/ NEQS.	
Indicator ① Qualities of river waters and ambient air are evaluated based on the internationally recognized standards as follows; (Air Quality at Air Monitoring Station) All target EPAs (Water Quality at Pollution Source) Pak, Punjab, Sindh-EPAs (Water Quality) All target EPAs	Achievement Air Monitoring Station: Each EPA interpreted, evaluate monitoring data and formulate the reports for management plan. Capacity for interpreting and evaluating monitoring data was increased. Water (Pollution Source, environment): Evaluated monitoring data was described in the provincial monitoring report. Data were evaluated based on Japanese standard since NEQS for ambient water had not been finalized yet though the draft was available.
Indicator ② Pollution sources and pollution loadings are presumed based on the environmental monitoring data as follows; (Air Quality at Air Monitoring Station) (Water Quality) All target EPAs	Achievement Air (Monitoring Station): Pollution loadings were presumed based on the monitoring data at each EPA. Water: Pollution load was calculated based on the monitoring data. Pollution source inventories were identified except

[8] The average of variance for the analytical results of the QC samples was less than 20% for Ni (Nickel), Ag (Silver) and Fe (iron) (Pak-EPA) less than 20% for COD (chemical oxygen demand), TSS (total suspended solids), and TDS (total dissolved solids) (Punjab EPA) and less than 20% TSS and TDS (Sindh EPA.)

	Balochistan EPA during the project implementation.
Indicator ③ : Conceptual environmental management plan(s) are proposed for some pilot area as follows; (Air Quality at Air Monitoring Station) Pak, Punjab, Sindh-EPAs (Water Quality) All target EPAs	Achievement "Report on water quality monitoring and management plan" and "Air Quality Monitoring Report" in pilot area were developed in each EPA.
Output 5: Based on the EMIS, Pak-EPA and Provincial EPAs are capable of compiling monitoring data and disseminating to the public.	
Indicator ① Environmental Monitoring Information System is in place in Pak-EPA.	Achievement Air Monitoring Information Network was revised and EMIS was developed in Pak-EPA.
Indicator ② Websites are properly updated in Pak-EPA and Punjab-EPA.	Achievement Pak-EPA uploaded the monitoring data, which was shared by each provincial EPA, at the website.It was authorized by the Provincial Government to upload the data in Punjab EPA.
Indicator ③ Environmental monitoring report in at least one of the pilot areas is published at least once.	Achievement Monitoring data in pilot area were organized and ready to open to public. Environmental monitoring report of each province was developed and integrated to one report.

Source: Documents provided by JICA and Interviews to each EPA.

As described, the project largely achieved its purpose.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

Overall Goal

Environmental monitoring systems are in place at Pak-EPA and Provincial EPAs

EPA staff members have maintained their capacity for environmental monitoring since the project was completed. On the other hand, some of the EPAs had difficulty securing maintenance costs for analytical equipment provided under the EMS project and the cost of consumables and spare parts for conducting adequate activities during the a certain period between project completion and the ex-post evaluation (see Table 3: Achievement of Overall Goal, Indicator ①). The changes in the budget allocation process and staff recruitment linked to the devolution of administrative functions (unforeseen in the planning stages) largely affected the difficulties in securing budget.

Under the initial plans, the necessary budget for monitoring activities after project completion was to be allocated by the federal government. Later, however, pursuant to the devolution of administrative functions in 2011, Pak-EPA and the Provincial EPAs

were required to procure funds from the provincial governments (Refer to 3.1.4. Adequacy of Project Planning and Approach in Relevance for detail). Following this change, each Provincial EPA proposed a budget to its provincial government, whereupon Punjab-EPA and KPK-EPA secured budgets. No enough budget for monitoring activities was approved in Balochistan, but the Balochistan EPA nonetheless managed to secure funds by partly drawing from its non-development (general) budget and receiving support from Non-Governmental Organizations, etc. Meanwhile, the major monitoring activities of some of the EPAs were discontinued due to budget restrictions during the certain period between project completion and the ex-post evaluation. Pak-EPA, for example, partially conducted monitoring activities for water but not for air since both fixed and mobile monitoring stations could not be operated. The EMIS installed at the Central Laboratory for Environmental Analysis and Networking in Pak-EPA was also partly inoperable, and data collected at the Provincial EPAs were not transferred[9]. Sindh EPA has outsourced the monitoring on water, which is required for the environmental tribunal cases, and ceased other monitoring activities. Monitoring plans have been formulated accordingly, but the securing a budget and regularly preparing environmental monitoring report was clearly limited at the time of the ex-post evaluation. This means that the project has achieved its overall goal in the sense that an environmental monitoring system is in place to a certain degree, but the functionality of the system is still limited.

Table 3　Achievement of Overall Goal

<table>
<tr><th>Overall Goal</th><th>Indicator</th><th>Achievement</th></tr>
<tr><td rowspan="2">Environmental monitoring systems are in place at Pak-EPA and Provincial EPAs.</td><td>Indicator ①
Each EPA can secure the budget for environmental monitoring.</td><td>Securing the needed budget
<table>
<tr><th>Year \ EPA</th><th>Pak</th><th>Punjab</th><th>Sindh</th><th>KPK</th><th>Balochistan</th></tr>
<tr><td>2012/2013</td><td>×</td><td>○</td><td>×</td><td>○</td><td>△</td></tr>
<tr><td>2013/2014</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
</table>
Note: ○ Budget was secured、× Budget was not fully secured.
See “Sustainability” for the amount.
Source: Questionnaires responses and interview survey</td></tr>
<tr><td>Indicator ②
Each EPA formulates environmental monitoring plans by themselves.</td><td>Formulating Environmental Monitoring Plans
<table>
<tr><th>Pak</th><th>Punjab</th><th>Sindh</th><th>KPK</th><th>Balochistan</th></tr>
<tr><td>△
(Only water)</td><td>○</td><td>×</td><td>○</td><td>○</td></tr>
</table>
Source: Questionnaires responses and interview survey</td></tr>
</table>

[9] One explanation for the inoperable condition of the EMIS is a lack of technical staff who can operate the EMIS. A second factor has been budget constraints. Furthermore, electricity supply was cut off at Pak-EPA when the staff worked at temporary offices due to an office move in January 2014. Power cuts were frequent even after the move, which made it very difficult to procure a stable power supply for the equipment. (Based on interviews with staff members of Pak-EPA.)

	Indicator ③ Pak-EPA and provincial EPAs publish environmental monitoring report	Developing Environmental Monitoring Reports Pak: △ (Only water); Punjab: ○; Sindh: △ (Only water); KPK: ○; Balochistan: ○ Source: Questionnaires responses and interview survey

3.2.2.2 Other Impacts

① Impacts on the Natural Environment

Based on the results of interviews with the EPAs, the project did not exert any environmental impact. The ex-ante evaluation addressed concerns about the disposal of heavy metals and organic solvent used for analysis. However, it was confirmed during the site survey that these substances were properly dealt with under the QC/QA system.

② Land Acquisition and Resettlement

There was no resettlement of residents or site acquisition during the project, according to the interview surveys to implementing agencies which was conducted in ex-post evaluation.

③ Other impacts

・Improvement of data submitted to Environmental Tribunals

As described in "Effectiveness", the quality of the monitoring system has been improved through the implementation of the project, which inevitably has facilitated the provision of more reliable environmental data to the Environmental tribunal. In addition, by utilizing the equipment provided by the grant aid project, the EPAs are now capable of analyzing a full set of parameters in air monitoring, which has contributed to the preparation of the "Pakistan Clean Air Program."

・Sharing the Enhanced Capacity within the EPAs

In total, 102[10] staff members were trained during the project and knowledge and experiences were shared within each EPA after the project completion[11]. The EPA laboratories also received interns from universities and graduate schools students to teach them about monitoring activities. Thus, enhanced capacity under the project has indirectly helped to increase the capacity of EPA staff who was not involved the training and EPA staff at regional offices and students from

[10] Pak-EPA (11), Punjab EPA (31), Sindh EPA (18), KPK-EPA (23), Balochistan –EPA (9). Please refer to 3.4.2 Sustainability: Organizational Aspects.

[11] In total, 39 staff members (3 from Pak-EPA, 5 from Punjab EPA, 21 from Sindh EPA, 4 from KPK-EPA and 6 from Balochistan EPA) were trained during the interim between project completion and the ex-post evaluation. This number includes not only staff members from Provincial EPAs , but also staff members working at the laboratories of the regional EPAs.

universities and graduate schools.

As mentioned above, the project purpose, the strengthening of capacity for the implementation of monitoring activities, has been achieved through project activities. The processes of budget allocation and staff recruitment were changed, however, as a consequence of the devolution of environmental administrative functions from the Federal government to Provincial governments. This change was not foreseen during the planning stage. Some EPAs have been unable to conduct major monitoring activities because of difficulties in securing budget. While the technical capacity has been enhanced at those EPAs, their activities have not been fully functional. In short, the shortcomings in the function of the system have precluded achievement of the overall goal, while the system itself has been institutionalized to some extent. The effectiveness and impact of the project is fair.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

Table 4 Summary of Project Input

Inputs	Plan	Actual
(1) Experts	6 Long-Term	13 Long-Term (109.46 MM*) - Team Leader/Monitoring Planning - Water Monitoring A/B/C - Air Monitoring A/B - QC/QA - Data Communication - Project Coordinator
(2) Trainees received	4 Counterparts / year	12 Counterparts in total
(3) Equipment	-	Maintenance and repairment cost of equipment, Replacement of spare and other consumable items (Approximately 15.9 million yen)
(4) Operation Cost	-	Approximately 18 million yen
Japanese side Total Project Cost	360 million yen in total	450 million yen in total
Pakistan side Operational	Rupee (Rs.) 86.08 million	(Rs.) 47.7 million Approximately 41 million yen[13]

Expenses	Approximately 116 million yen[12]	

* MM stands for man month.

3.3.1.1 Elements of Inputs

According to the interview surveys of each EPA staff member, the number of dispatched experts and their expertise were appropriate. Though the number of dispatched long-term experts increased from the initially planned 6 to 13, a few experts in monitoring and project coordinators were dispatched and shared the tasks. Thus, the total number of inputs was achieved as planned. Furthermore, Japanese experts were prohibited from visiting KPK and Balochistan EPAs for security reasons after the project began. At those two EPAs, staff members participated in training conducted at Islamabad and Karachi. Both EPAs stated, however, that training and practice with the equipment installed on-site would have been preferable. Thus, it may be worthwhile to examine training methods to enable training at each EPA's laboratory, for example, by dispatching the trained EPA staff from other EPAs when Japanese experts are unable to visit the sites.

As for the assignment of counterparts on the Pakistan side, counterparts were not necessarily sufficient in number. It was partially because Pakistan government did not allow to employ new staff as government officials for a certain period. Therefore, the total number of EPA staff was also generally limited. According to the interview surveys of Japanese consultants, the project had to be conducted with the assigned number of staff under these situations.

3.3.1.2 Project Cost

The actual cost for the Japanese portion was 360 million yen, which was higher than the original plan of 450 million yen (125 % of the original plan). The expenditure was affected by unexpected causes such as increased maintenance costs for the equipment provided by the EMS project, budget diversion to rescue operations after floods and rehabilitation from earthquake damage, and the devolution of the Ministry of Environment functions. These situations compelled the Japanese side to cover part of the expenses that were initially to be borne by the Pakistan side. According to the Japanese experts, project activities would have come to a standstill if the Japanese side had decided not to cover parts of the Pakistan side's burden (because some of the equipment would have been inoperable). This extra expense was therefore considered

[13] Exchange rate during project implementation (February 2009 ～February 2012): 1Rs. = 0.86 yen.
[12] Exchange rate at the time of the ex-ante evaluation (August, 2012): 1 Rupee (Rs.) = 1.35 yen.

unavoidable.

3.3.1.3 Period of Cooperation

The project was implemented from February 2009 to February 2012 which was as planned with no extension.

Although the project period was within the period, the project cost exceeded the plan and Japanese side covered part of Pakistan portion. It is because of natural disasters and the devolution of the organizations in Pakistan. Therefore, the efficiency of the project is fair.

3.4 Sustainability (Rating:②)

3.4.1 Related Policy and Institutional Aspects for the Sustainability of Project Effects

The priority environmental issues for economic growth and development was still in place at the time of the ex-post evaluation. "Pakistan Vision 2025," the Development policy at the time of the ex-post evaluation (formulated in 2014), also put priority on the environmental sector. The policy set "energy, food, and water security" as one of the seven pillars to support development and stressed the importance of environmental protection for sustainable economic growth and development.

Furthermore, each EPA has worked to formulate a "Provincial Environmental Act" since the devolution to the Provincial governments in 2011. The progress of each province is summarized below.

-Pak-EPA: In the process of approving the new act
-Punjab EPA: Approved（2012）
- Sindh EPA: Approved（2014）
-KPK-EPA: Approved（2014）
-Balochistan : Approved（2013）

As explained in "Relevance," Pakistan has been consistent to show the policies to promote the measures for environmental pollution control for the last two decades. Even after environmental policies and budgets devolved to the Provincial EPAs, each Province has worked to formulate and approve its own act. Thus, the sustainability of project effects from policy and institutional aspects can be confirmed.

3.4.2 Organizational Aspects of the Implementing Agency for the Sustainability of Project Effects

(1) Coordination among EPAs

During the project implementation, the Pakistan government announced an 18th

amendment to its Constitution and devolved a part of administrative functions from federal government to provincial government. In line with the devolution, the Ministry of Environment was dissolved in June 2011. Accordingly, the responsibility and budget for environmental administration were transferred to each Province. As a result, the administrative structure shifted from an umbrella form in which Pak-EPA was a subsidiary organization under the Ministry of Environment and allocated/ assigned budget /staff to the Provincial EPAs to a modified form in which each Provincial EPA ensured its own budget and staff. Then the regulating authority of Pak-EPA changed to the Ministry of Disaster Management and the Provincial EPAs for the Provincial governments. Therefor there is no administration linkage between Pak-EPA and the Provincial EPAs, the EPAs have largely stopped coordinating and communicating since the project completion. The EPAs were initially expected to continue their periodical meetings to discuss the progress of securing budget, the regularization of project staff, the status of monitoring implementation, issues for operation, and data sharing, those meetings have not progressed since the project completion. The interview surveys conducted during the ex-post evaluation show that each EPA hopes to establish a forum for sharing issues and experiences, so improvement is expected.

(2) EPA staff members for the monitoring activities

The number of staff members engaged in monitoring activities and the numbers of staff members trained under the project and currently working at the EPAs are shown in Tables 5 and 6, respectively.

Table 5　Number of EPA Staff Members at the Time of the Ex-post Evaluation

(Unit: Number)

	Pak	Punjab	Sindh	KPK	Balochistan
Number of EPA Staff in Total	62	200	97	85	145
Number of Staff Engaged Monitoring Activities	6	19	42	17	15
Deficiency in the Number of Staff Members for Monitoring	4	Sufficient	Sufficient	Sufficient	Sufficient

Note: The number of EPA staff in Total includes all supporting staff as well. The number of staff members engaged in monitoring activities includes staff members who are working at regional offices positioned beneath the EPAs organizationally

Source：Interview surveys of EPA staff

Table 6 Numbers of Staff Members Trained under the Project and Trained Staff Members Working in the EPAs

(Unit: number)

	Pak	Punjab	Sindh	KPK	Balochistan
Trained Permanent EPA Staff	8	29	18	17	10
Retained Trained Permanent EPA Staff	6	19	13	14	9
Trained Project Staff	11	5	5	3	-note
Retained Trained Project Staff in the EPAs	0	0	1	0	-note
Staff trained by other staff who were trained under the project	16	5	21	4	6

Note: Balochistan EPA did not accept project staff assigned by the Federal government and employed local persons for the project with its own budget.

Source: Interview surveys to EPA staffs

At the time of the ex-post evaluation, a lack of the staff member for monitoring activities was confirmed in Pak-EPA. Under the project, permanent staff working at the EPAs and project staff employed for the project for a fixed term (project staff) took the training. The project staff members were selected by the federal government and dispatched to the Provincial EPAs as of the commencement of the project. In the planning stage, it was assumed that the project staff would be regularized as permanent staff by the Federal government and ultimately employed in the Provincial governments. This scheme could not be applied after the devolution of the administrative functions to the provincial governments. Thus, most of the project staff members were not retained at EPA after the project completion. Each EPA has made its best effort to re-employ the project staff. However, the recruitment process of the provincial governments basically takes a long time, so in some cases the staff found other jobs while waiting. Pakistan also stopped recruiting new staff for a certain period due to the tight fiscal situation. As a consequence, it was very difficult to regularize the project staff to permanent staff as planned. On the other hand, the recruitment exam and staff selection at the commencement of the project were conducted in Islamabad without the involvement of the provincial governments. As such, the strong regional roots and identification characteristic of Pakistanis probably dissuaded project staff from staying on at the EPA as permanent staff. There is clearly a need to examine feasible ideas for the selection methods to be used for sustainably recruiting project staff.

3.4.3 Technical Aspects of the Implementing Agency for the Sustainability of Project Effects

The trained technical staff of the EPAs reached a certain level through their

experiences in formulating monitoring plans, collecting samples, analyzing and compiling data, preparing reports, and maintaining the equipment for the analysis under the project. The interview surveys clearly showed that the staff members engaged in the project and the EPA staff members they trained have largely retained their technical capacity in each EPA. Manuals for the maintenance of analysis equipment prepared under the project have been placed at laboratories and mobile stations and utilized in a timely fashion; hence no major issues to do with technical capacity have arisen.

One concern, the expensive costs for maintenance of the analytical equipment, spare parts, and consumables, was common at all EPAs and hindered efforts to obtain the necessary equipment, etc. in sufficient numbers (Please see "3.4.4 Financial Aspects of the Implementing Agency for the Sustainability of Project Effects" for details).

3.4.4 Financial Aspects of the Implementing Agency for the Sustainability of Project Effects

(1) Budget for monitoring activity

As explained in "Impact," securing the budget is a must for the monitoring system of the EPA to function. The monitoring budget was approved for all of the EPAs in the fiscal year of 2013/2014, including those that lacked budget after project completion. Thus, the situation shows a trend toward improvement (Table 7).

Difficulties for securing budget after the project completion were also largely rooted in the devolution of administrative functions in 2011. The project initially planned had an umbrella structure in which project budget was allocated from the Non-development budget[14] of federal government to Pak-EPA and then further allocated by Pak-EPA to the Provincial EPAs. This structure was dismantled after the devolution. Under the new structure, each EPA was required to propose and secure budget to its provincial government. The EPAs, however, were confronted with a situation they had not foreseen in the planning stages and were still in the process of securing budget for environmental monitoring. More time was therefore needed for obtaining approval from the provincial governments, which made it more difficult to ensure their budgets. Eventually, at the time of the ex-post evaluation after devolution of administrative functions, the system settled into place and the transition period started to converge. Furthermore, the budgets at each EPA have been approved, hence improved prospects can be seen.

[14] In Pakistan, budget for each ministry is composed of two types, namely non development budget and PC-1 which is development budget.

Table 7 Non Development Budget and Monitoring Budget of Pak-EPA and the Provincial EPAs

(Unit : Pakistan Rupee (Rs.) Million)

	Non Development Budget		Monitoring Budget [Note 1]			Other / Future Prospect
	2013/2014	2014/2015	2012/2013	2013/2014	2014/2015	
Pak	21.2	36.8	0.2	0.2	5.3	Utilization of a part of the PC-1[Note 2] budget is planned.
Sindh	135.7	137.5	0	0	30.0	Rs.140 million of the PC-1 budget for 3 years has been confirmed.
Punjab	10.5	15.3	3.75	17.5	28.5	The PC-1 budget up to 2015/16 was confirmed.
KPK	-	-	-	Utilize non development budget	0.3	Rs. 3 million has been expensed for repairing fixed air monitoring stations.
Balochistan	169.2	210.6	Collaborate with NGO	1.5	Utilize non development budget	Proposed and confirmed Rs.2 million for 2014/15. Waiting for disbursement.

Note 1 : The monitoring budget includes the entire cost related to laboratories activities, including maintenance costs for analytical equipment and costs for spare parts and consumables.

Note 2 : The Development Budget is allocated based on project proposals. The Ministry budget of Pakistan is composed of the Non-development Budget and Development Budget based on the project, excluding research.

Note 3: The amount in this table is the information confirmed at February 2015 by the evaluation team.

Source: Questionnaire responses and interview survey

(2) Maintenance budget for analytical equipment

Pak-EPA and Sindh EPA have not operated the equipment for a certain period since project completion. However, their budgets for 2014/2015 were finally approved and confirmed during ex-post evaluation, and both EPAs have requested maintenance agents to enable them to resume operation[15]. The estimates from the agents were Rs. 13.7 million for Pak-EPA and Rs. 20 million for Sindh EPA. These amounts were 2.5 times the annual monitoring budget for Pak-EPA and more than 60% of the annual operating budget of Sindh EPA, respectively. These costs are being negotiated, as all of the EPAs have been advised that high costs for maintenance, spare parts, and consumables for equipment will be a major determinant of their ability to continue the monitoring activities in the future. When examining the operating cost for equipment, the project needed to make maintenance plans to clarify the necessary cost[16], secure appropriate procurement roots for necessary consumables and spare parts, and consider ways to keep cost lower such as longer-term (e.g., 5-year) service contracts with the agents. In addition, only one agent in Pakistan deals in maintenance and repair for

[15] Maintenance is required for re-operation because the equipment has not been operated for a long period.

[16] The necessary maintenance costs for the project were estimated based on the same conditions during the project implementation, where no taxes were imposed. A huge difference in the actual cost appears when tax is imposed. Therefore, the tax rate and inflation rate should both be factored into the estimates for the feasible and real cost.

analytical equipment. This monopolistic situation leads to longer response times and higher costs.

Some minor problems have been observed in terms of organizational and financial aspect of the implementing agencies. Therefore, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was conducted with the aim of enhancing the capacity of the Pak - EPA and the Provincial EPAs to conduct environmental monitoring on air and water in Pakistan. The purpose of this project was consistent with Pakistan's development policy and needs, which prioritized the environmental protection due to the issue of increasing the pollution, as well as Japanese assistance policy. Thus, its relevance is high. Thanks to the project, Pak-EPA and Provincial EPAs now have enhanced capacities to formulate monitoring plans and are capable of collecting and analyzing data based on a uniform Standard of Procedure which was not existed before the project. A Quality Assurance and QA/QC system for laboratory activities was introduced in the process, and the capacity to analyze and evaluate data in line with internationally recognized standards was gained. On the other hand, the budget allocation and staff recruitment process were both changed broadly as a consequence of the devolution of the ministries responsible for environment from the Federal to Provincial government. Due to these changes, major monitoring activities were limited at some of the EPAs where budget for monitoring activities was not secured. While the environmental monitoring system was developed, these limitations in monitoring have prevented the system from reaching full functionality in practice. Thus, the effectiveness and impact of the project are fair. While the project period was within the plan, the project cost exceed the plan, thus its efficiency is fair. As for sustainability, coordination among the EPAs was sometimes lacking, and low retention rate of staff employed by the project in terms of institutional aspect as well as expensive maintenance cost and spare parts and consumable cost in terms of financial aspect were raised as EPA's concerns in terms of financial aspect. Thus its sustainability is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

・Continued efforts for securing the sustainability

In order to sustain the project effects, it will be essential to secure a sufficient budget

for monitoring activities and an appropriate number of technical staff persons with sufficient competencies. Since project completion, each EPA has had difficulties in securing budget and regularizing the project staff because the Provincial EPAs were in a process of devolution. For the future, EPAs will need to continue their efforts to secure budget and technical staff in the following ways.

- Regularizing the project staff

  EPAs were recruiting technical staff for monitoring activities during the ex-post evaluation survey. Staff persons must be employed in sufficient numbers and have sufficient skills. At the time of ex-post evaluation, only one project staff member with enhanced capacity was working at the EPAs. To become a permanent staff of a Provincial EPA, the hiring must take place via the provincial government recruitment system. However, active steps to acquire project staff, for example, by recommending project staff to apply via the Provincial recruitment system, are required for the effective and efficient utilization of the acquired capacity.

- Securing the budget for monitoring activity and thorough preparation

  After the project completion, some EPAs had not secured sufficient budget and were forced to discontinue certain activities for a certain period. At the time of project completion, the budget had been approved at all of the EPA. EPAs need to continue their efforts to secure budget. At the same time, it is recommended to allocate the budget for the laboratory and monitoring activities, not only from non-development budget as well as a part of PC-1 (project budget).

・Strengthening coordination among the EPAs

After the devolution of the federal government functions to the Provinces, coordination and communication between Pak-EPAs and the Provincial EPAs were lost. However, ongoing and regular follow-up among EPAs is effective for collaboration to formulate integrated reports and sharing information on maintenance, which ultimately improve the future environmental monitoring system and quality of maintenance. In the future, Pak-EPA and the Provincial EPAs must cooperate and hold periodical follow-up meetings.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

・Considerations for the cost of spare parts, consumables and maintenance

Expensive costs for spare parts, consumables and maintenance are a major concern for all of the EPAs. The current situation, with only one agent who can deal with maintenance and repair in Pakistan, has delayed maintenance response times and driven up costs for the EPAs. This situation should be avoided by any means possible for similar type of project in future. Prices for genuine spare parts and consumables for major analytical equipment are high from the outset. It would have been important in the planning stage during the project, or at least before project termination, to examine how to procure them in appropriate quantities with proper maintenance to maintain sustainability. Some of the equipment used in the project was provided by a grant aid EMS project. Thus, the project had to share information with the implementing agency during the project to create a detailed maintenance plan and maintenance budget to carry forward after project completion. Another useful option is to conclude service contracts with agents for longer periods (around 5 years) to keep the price at predictable and tolerable levels in the future.

・Project plan and implementation that contribute to efficient and effective equipment operation

The aim of the project was to strengthen the EPAs capacity to conduct monitoring activity using analytical equipment provided by the grant aid EMS Project. Some analytical equipment, however, was inoperable when the project started. Additional time and cost for maintenance were therefore needed. It would be helpful to consider strategic ways for implementing the project to avoid these circumstances, for example, by implementing a grant aid project that provides equipment and a technical assistance project that supports the effective utilization of equipment simultaneously or continuously.

・Sustainable project staff recruitment in Pakistan

The project staff members employed during the project period were paid with funds from the PC-1 (project) budget allocated to the development project. In Pakistan, a land of strong regional identities, people are often reluctant to accept permanent employment in a province away from home. In the interest of sustainability, the involvement of provincial government and selection of staff locally would be essential.