Ex-Post Project Evaluation 2016: Package I-2 (India, Myanmar, Laos)

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JAPAN INTERNATIONAL COOPERATION AGENCY

Kaihatsu Management Consulting Inc.

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India

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project
"The Project for Strengthening of Electronic Media Production Centre
in Indira Gandhi National Open University"

External Evaluator: Tomoko Tamura, Kaihatsu Management Consulting, Inc.

0. Summary

This project was implemented to improve the efficiency and quality of video programme production[1] for students of the Indira Gandhi National Open University (hereinafter referred to as "IGNOU") in India, by renewing and digitalizing the equipment necessary for production of videos; thereby contributing to the students' learning and expanding usage of the video programme of the university.

The project has been highly relevant to the development plan of India, which aims to improve the enrollment rate in higher education and to promote distance and open education; to the development needs of the Electronic Media Production Centre (hereinafter referred to as "EMPC"). EMPC, which is attached to IGNOU and engaged in production of audio-visual programmes, needed to maintain and enhance its capacity to produce videos that would meet the needs of students who want to watch video programmes. The project has also been highly relevant to Japan's ODA policy, which places importance on assistance that increases educational opportunities for poor and socially vulnerable people. Therefore, the relevance of the project is high.

Procurement of equipment was conducted as planned. Although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.

At the time of the ex-post evaluation, EMPC was producing more than 200 video programmes per year, which was the target figure for the project. Efficiency of video production had improved as a result of equipment procured by the project. Impacts of the project include expansion of the usage of the video programmes produced by EMPC in various ways. For example, video programmes were uploaded to the digital library on the IGNOU website, and distributed through the online programme and satellite broadcasting programme, which were newly introduced by the Indian government. Therefore, the effectiveness and impact of the project are high.

There were no problems with the operation and maintenance of the equipment introduced by the project in terms of institutional aspects. Staff of EMPC have the basic technical know-how to utilize the equipment introduced by the project, and have taken necessary measures for further improvement of techniques. There was no problem with the financial status of IGNOU or EMPC. Most of the equipment procured by the project was continuously utilized well. Repairs were being arranged for any equipment that had problems. EMPC was taking necessary

[1] The summary of the ex-ante evaluation report of this project states "improve efficiency of production of the audio-visual programme and expand usage of the programmes". Audio-visual programme includes audio (radio) and video programmes. In this sentence, "video programmes" was used instead of "audio-visual programmes", because there was no assistance from the project for radio programmes.

steps to arrange an annual maintenance agreement. In this way, there were no problems with the operation and maintenance of the equipment introduced by the project in terms of institutional, technical and financial aspects. Therefore, sustainability of the project effects is high.

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

1. Project Description

Project location

Equipment introduced by the Project

1.1 Background

IGNOU is a national university for open and distance education established in 1985, with its head office in New Delhi. It aims to provide people from every segment of society with better access to higher education, and offers high quality and innovative programmes to meet various needs of the people. In addition to the head office, there are 67 Regional Centers, which assist students with administration, including enrollment and examinations; 2,981 Learner Support Centers, where counseling sessions are conducted during weekends; and 12 overseas partner institutions, which mainly assist Indian nationals living abroad to study at IGNOU (numbers of institutions are as of 2016). IGNOU conducts certificate, diploma, bachelor's degree, master's degree and PhD programmes, as well as adult and community education courses. There are around 3 million students in India and overseas.[2]

Students at IGNOU mainly learn from textbooks (so-called self-learning materials) provided by the university. They can use audio-visual materials and participate in tele-conference session, which are conducted by broadcasting media, to supplement this textbook learning. Academic counselors[3] conduct face-to-face classroom sessions for students during weekends at the Leaner Support Centers.

Students can watch and listen to audio-visual materials by national satellite broadcasting, an FM radio station dedicated to educational purposes, and the IGNOU website. The audio-visual materials are kept at the Regional Centers and Learner Support Centers of IGNOU, and are sold to students who request them.

EMPC's main work is production of audio-visual materials for IGNOU. However, at the time of planning the project they found it difficult to produce video programmes because the

[2] Source：IGNOU website (www.ignou.ac.in). Accessed on July 7th, 2016.

[3] Teachers of other universities and educational institutions are appointed as academic counselors on a part-time basis. They are not full-time teaching staff of IGNOU.

equipment was old and decrepit. Therefore, it was necessary to renew the equipment for EMPC to continue video production.

The Japanese government had provided EMPC with equipment for editing and production of video programmes through two grant aid assistance programmes in 1988 and in 1993 – 1994.

IGNOU（Vice Chancellor's Office）

EMPC

Regional Center (Delhi III)

Learner Support Center

1.2 Project Outline

The objective of this project is to improve the efficiency and quality of video production for students at IGNOU in India, by renewing and digitalizing the equipment necessary for video production; thereby contributing to students' learning and expansion of usage of the video programme of the university.

E/N Grant Limit / Actual Grant Amount	787 million yen/ 752 million yen
Exchange of Notes Date/ Grant Agreement Date	July 2010/ July 2010
Executing Agency	Indira Gandhi National Open University (IGNOU)
Project Completion	July 2013
Main Contractor	(Equipment) Mitsubishi Corporation
Main Consultant(s)	NHK Integrated Technology Inc.
Basic Design	October 2009 - May 2010
Related Projects	Grant aid assistances - The Improvement of Educational Technology Equipment of the Indira Gandhi National Open University (1988) - Project for Improvement of Educational Media Production Facilities to Indira Gandhi National Open University (The first phase in 1993 and the second phase in 1994)

2. Outline of the Evaluation Study

2.1 External Evaluator

Tomoko Tamura, Kaihatsu Management Consulting, Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: July 2016 – July 2017

Duration of the Field Study: November 6th - 18th, 2016, February 27th - March 3rd, 2017

2.3 Constraints during the Evaluation Study

The results of the beneficiary survey conducted for the current and former students as part of the ex-post evaluation cannot be generalized because the sample size was only 139, whereas there are 3 million students in the university; the sampling was made by judgement sampling method. (Details of the survey method are described in footnote 9).

3. Results of the Evaluation (Overall Rating: A[4])

3.1 Relevance (Rating: ③[5])

3.1.1 Consistency with the Development Plan of India

At the planning of the project, *the Eleventh Five-year Plan* (2007 - 2012) of India placed emphasis on improving the enrolment rate in higher education and expanding distance learning education. It also prioritized upgrading facility of IGNOU. Improving the enrolment rate in higher education and expanding distance learning education were also an important policy in *the Twelfth Five-year Plan* (2012 - 2017) at the time of completion and ex-post evaluation of the project. It places emphasis on enhancing education conducted by open and distance education institutes, including IGNOU, and improving people's access to adult education. The enrolment rate in higher education of the country was 11 percent and 17.9 percent in 2005[6] and 2011-12[7] respectively. The country aims to increase it to 25.2 percent by 2020-2021.

At the time of the ex-post evaluation, the Indian government had introduced Swayam MOOCs[8], which is a system for massive open online courses of education, in order to actively further promote open and distance learning in accordance with the development plan.

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

[5] ③: High, ②: Fair, ①: Low

[6] The rate was very much lower than the world average of 23.3 percent and average of Asian countries of 22 percent at that time. (Source: The preparatory study of this project)

[7] Financial year of India is from April to March the following year. In this report, the financial year from April 2011 to March 2012 is described as 2011-12, for example.

[8] MOOCs became popular in the U.S.A. at the beginning. MOOCs in India uses a platform called Swayam. The programme on this platform is described as Swayam MOOCs in this report. In addition to IGNOU, universities under the University Grants Commission and National Open Education Institute and others provide programmes to Swayam MOOCs. Uploading of video programmes for 2,535 courses was completed as of March 2017. Learning methods of the courses include video programmes, downloaded textbooks, tests and quizzes for self-evaluation, and online questions and answers. Once a Swayam MOOC course is completed, it is recognized as a credit at existing educational institutions.

As mentioned above, improving the enrolment rate in higher education and promoting open and distance education were important areas in the development plans of India from the time of project planning to the ex-post evaluation. Therefore, this project, which aimed to assist learning at the open university, is highly consistent with the development plans of the country at the time of planning and ex-post evaluation of the project.

3.1.2 Consistency with the Development Needs of India

At the time of project planning, some of the equipment of EMPC had been used for more than fifteen years, and exceeding the expected life of the equipment. It was difficult to find spare parts, and some of the equipment often became out of order or unable to use. Sometimes video recording would be interrupted and had to start again from the beginning - for example, when they could not change cameras smoothly by video switchers, or could not zoom out or zoom in at the time of capturing close-ups of the performers, due to a problem with the motor of a camera. There was concern that the old equipment would become unusable in a few years, and EMPC would find it very difficult to produce video programmes.

Furthermore, it was necessary to renew the equipment to maintain and enhance capacity of EMPC for video programme production - the need for video production remained high, as the number of academic programmes and students enrolled at IGNOU were rapidly increasing at that time, as shown in Table 1. There was also a need to produce video programmes for satellite TV broadcasting.

Table 1 Number of Schools of Studies, academic programmes, students, etc. of IGNOU

Items	At project planning (2008-09)	At project completion (2013-14)	At ex-post evaluation (2016)
Schools of Studies	21	21	21
Academic programmes	175	226	228
Students registered	2,000,000	2,810,958	3,100,000
Students newly registered during the year	555,310	722,000	796,127
Academic counsellors	Not available	33,212	43,785
Regional centers	59	67	67
Learner support centers	2,250	2,667	2,981

Source: Sources of figures at project planning, project completion and ex-post evaluation are the preparatory study of this project, IGNOU website and a document provided by EMPC respectively.

Distribution of video programmes by internet and satellite TV broadcasting stagnated for around three years from October 2013, just after the completion of the project, due to a review of the operation and policies of the university. However, from May 2016 the university came up with a policy to use video programmes actively again to promote more effective and learner-friendly teaching. At the time of the ex-post evaluation, distribution of video programmes through the internet had been re-activated, and there was a prospect of satellite TV broadcasting being re-activated in June 2017. As mentioned earlier, there was also a need to

produce video programmes for Swayam MOOCs, which were introduced by the Indian government in 2016. The HD (high definition) equipment provided by the project is essential for production of video programmes for MOOCs, as the ministry instructed that the programmes should be produced in HD.

A beneficiary survey was conducted as part of the ex-post evaluation, with samples of 82 current students and 57 former students - 139 in total.[9] It was found from the results of the survey that the students of IGNOU highly appreciated video programmes, as they lead to better understanding of their studies. It was also found that there is a strong need for video production in the future. As shown in Figure 1, 40 percent and 20 percent of former and current students respectively had watched video programmes. Current students had a lower ratio than former students in watching video programmes, as distribution of video programmes by satellite TV broadcasting stagnated from October 2013, as mentioned earlier.

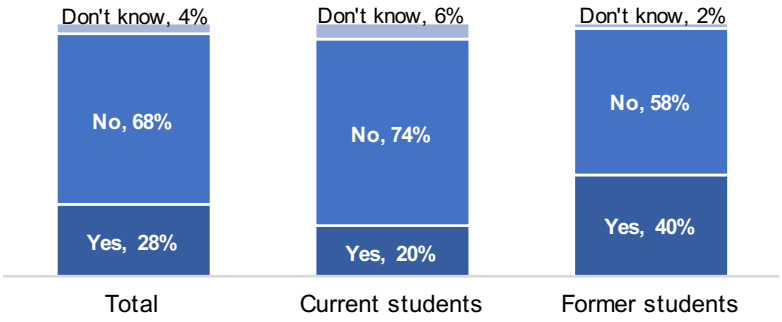

Figure 1 Have you watched any of IGNOU's video programmes?
(n=139 including 57 former students and 82 current students)

Source: Beneficiary survey

The survey team asked students who had watched video programmes if the video programmes were useful for their studies. It was found that video programmes assisted students' learning, because 99 percent of former students replied, "very much useful" or "useful", and 69 percent of current students replied "useful", as shown in Figure 2. This tendency was more significant among former students who were studying at the university when satellite TV broadcasting was on air.

[9] The face-to-face questionnaire survey was carried out for the current students, who were studying at the university in December 2016, and the former students, who were in the university from 2013 to 2014. The Schools of Studies and programmes that were utilizing video programmes to a certain extent were selected for the survey by obtaining cooperation from the student registration division of IGNOU and EMPC. For current students, those students studying at the Schools of Computer and Information Science (44 persons) and Sciences (38 persons) were surveyed by visiting two learning support centers in and around Delhi, when the counselling sessions for these courses were conducted. The survey team distributed the questionnaire forms to students who attended the session, and obtained valid replies from 82 students (complete survey). The School of Agriculture was selected for the survey of former students. Several former students of the Awareness Programme on Dairy Farming were asked to get together for the survey; the survey team obtained 25 valid responses. E-mails were sent to 104 former students of the Diploma on Food Safety and Quality Management of the School of Agriculture, as it was difficult to get them together. The survey team obtained a student list from the Administration Division of IGNOU for this. The team obtained valid responses from 32 persons. The number of samples for the survey was 139 in total. 70 percent of them were male (97 in total - 73 for the complete survey and 24 for the e-mail survey) and 30 percent were female (42 in total - 34 for the complete survey and 8 for the e-mail survey).

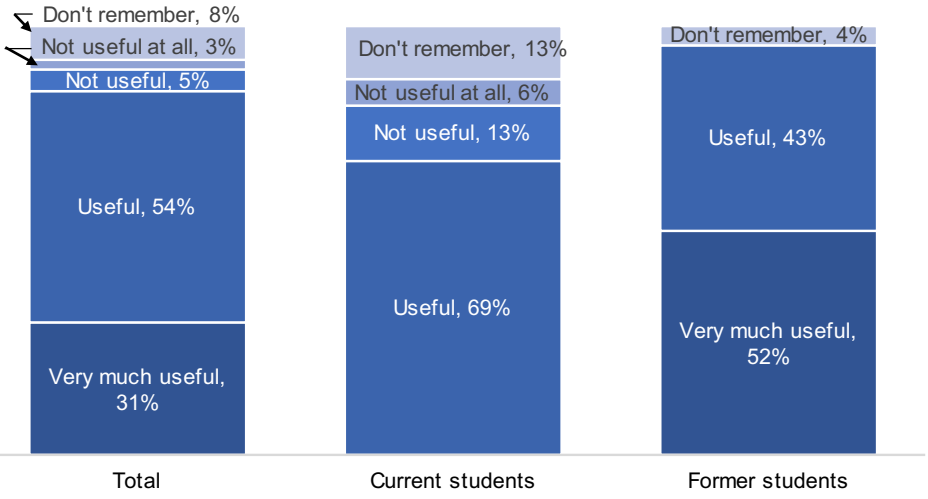

Figure 2 Were the video programmes useful for your study?

(n=39, including 23 former students and 16 current students, who have watched video programmes)

Source: Beneficiary survey

The survey team asked 16 current students who had watched video programmes, "Do you think it is good if more video programmes are available?". All of them replied "Yes" (see Figure 3). The survey team also asked current students who had not watched the video programmes or did not remember whether they have watched them or not, "Do you think it is good if video programmes are available?" 83 percent of them replied "Yes, I think so very much" or "Yes, I think so". (See Figure 4)

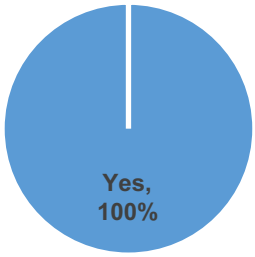

Figure 3 Do you think it is good if more video programmes are available? (n=16, current students who have watched the video programmes)

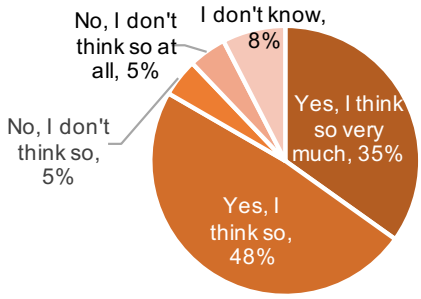

Figure 4 Do you think it is good if video programmes are available in future?

(n=66, current students who have not watched the video programmes or did not remember)

Source: Beneficiary survey

In this manner, the requirement for production of video programmes was increasing again at the time of the ex-post evaluation, and students were expecting to have more video programmes. Therefore, the necessity to renew or maintain the equipment for video production was high.

In this way, the need for video production at the university was high both at the time of planning and ex-post evaluation of the project; this project, which aimed to renew the

equipment for video production, was highly consistent with the development needs of the country throughout the period from planning to ex-post evaluation of the project.

3.1.3 Consistency with Japan's ODA Policy

The Country Assistance Policy of India at the time of project planning stated that reduction of poverty was an important target, and that it was necessary to expand opportunities for education to poor and socially vulnerable people to achieve this target. This project aimed to contribute to expanding the opportunity for higher education and advancement into society to the relatively vulnerable people of the country. Therefore, this project was consistent with the Japanese ODA policy.

This project has been highly relevant to the development plan and development needs of India, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating ②)

3.2.1 Project Outputs

This project introduced digital HD media, established a video sharing network, and a virtual studio.[10] In order to make the transition process from analog to digital smoothly and use and maintain the equipment to be procured well, a conversion system that enabled EMPC to convert existing analog recording media tapes into digital and save them on discs; measurement equipment for maintenance of the digital equipment; and a preview system for projecting recorded digital video programmes to a screen before broadcasting or duplication for evaluating quality of picture were introduced. As shown in the following table, there was no change in procurement and installation of the equipment; and the outputs were in accordance with the original plan.

[10] A system for digital real time synthesis of recorded images and computer graphics. It can combine the images of performers recorded in the studio and the background produced by data.

Table 2 Equipment procured by the project

Name of the equipment	Numbers
Video Programme Production Studio -1 (Virtual Studio System)	
Digital SD/HD color cameras	3
HD digital disc recorders	3
HD digital video system	1
HD character generator	1
Digital audio system	1
Video sync systems	2
Monitoring system	1 set
Intercommunication system	1
On-air light and tally system	1 set
Virtual set	1
Lighting equipment	90 (installed) +340 (spares)
Field recording system	
Digital camera system	3 sets
9-inch video monitors	3
UHF synthesizer transmitters	3
UHF synthesizer tuners	3
Microphones	12
Microphone cables	4 kinds x 3 sets
Stereo headphones	3
Portable lighting equipment	3 +18 (spares)
Portable audio mixer	1
Mini DV/HDV camcorders	3
Digital still cameras	3
Routing switcher system	
Routing switcher	1
Video sync system	1
Patch panels, A/D converters, D/A converters	7, 2, 2
Video sharing network (video server system)	2
SD/HD ingest terminals	2 each
Non-linear editing system	4
Multi format video server, etc.	1
DVD duplication system	1
Computer graphics systems	2
Measuring equipment	1 set
Analog/ digital format conversion system	1
SD/HD preview system	1
Spare parts	

Note: SD stands for standard definition.

Workstation for the virtual studio

Virtual studio

Terminal for computer graphics

Video equipment

Video server (left) and
routing switcher (right)

Analog/ digital formats converter

Source: Photos taken by the External evaluator

The consulting services, including assistance for tender procurement and installation management, was conducted as planned. There was no capacity development program (soft component); the manufacturer of the equipment provided training for staff at EMPC on basic operation of the equipment after installation.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The project cost was planned as JPY 851 million in total, which included JPY 787 million from the Japanese side and INR 32 million, equivalent to around JPY 64 million,[11] from the Indian side. Actual cost was JPY 789 million, which included JPY 752 million from the Japanese side and JPY 37 million[12] from the Indian side. The actual cost was within the planned cost (93 percent against the plan). The cost of the Indian side was reduced mainly because custom duties, demurrage fees and container usage fees at the harbor for import of the equipment were less than the planned amount as a result of IGNOU negotiating with the custom department and others several times.

3.2.2.2 Project Period

The project period was planned as fifteen months from September 2010, the commencement of the detail designing, to November 2011, completion of the operational training.[13] It was actually thirty-five months, from September 2010 to July 2013, and was significantly longer than planned (233 percent against the plan). The project period largely exceeded the plan mainly because there was a long delay in the administrative procedure for issuing various kinds of the Authorities to Pay (APs) by the Ministry of Human Resource Development. For example, EMPC could not use the equipment for around one year after it was imported and delivered to EMPC, because the consultant team could not install and hand over the equipment until the AP was issued. The delay in the project was also due to manufacturing of the equipment being delayed for around two months because some of the factories of companies engaging in manufacturing were damaged due to the Great East Japan Earthquake in March 2011. Another reason was that payment of custom duties by the Indian government was delayed for around three months.

IGNOU was the executing agency of the project, but the Ministry of Human Recourse Development, which was supervising IGNOU, had to make necessary arrangements for issuing APs and paying custom duties by making contacts with the Ministry of Finance and Custom Department. The Ministry took much longer than planned to make these arrangements despite EMPC repeatedly facilitating the Ministry in doing it, because the Ministry did not have a sense of ownership to the project, and was not familiar with the procedure.

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[11] Converted at the exchange rate at the time of project planning, INR1 = JPY1.97 (source: Report of preparatory study of the project).

[12] This consists of JPY36,200,000, the cost of custom duties, which was estimated as 5 percent of the contract amount of the equipment; and JPY793,251, the cost of hiring a project coordinator. The cost of the project coordinator was converted to Japanese yen by using the average exchange rate of IMF during the project period, INR1=JPY1.65.

[13] The project period stated in the report of the preparatory study of this project did not include the period from signing of the grant aid agreement to the commencement of the detail designing. Therefore, the planned and actual project periods were defined from the commencement of the detail designing to the completion of the operational training.

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

3.3 Effectiveness[14] (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

＜Operation Indicators＞

The number of video programmes produced per year was identified as an operation indicator of the project at the time of planning. The number of video programmes produced in the target year was set as 200, because the project planned to provide equipment that could produce around 200 video programmes per year. This was the number of videos produced per year at the time of planning of the project. As shown in Table 3 and Figure 5, the number of video programmes produced three years after completion of the project in the target year, was 351; therefore, the indicator was achieved.

Table 3 Operation indicators (Number of video programmes produced (number/ year)

Items	Baseline	Target	Actual			
	2008	2014	2013-14	2014-15	2015-16	2016-17*
	Baseline year	3 years after completion	Completion year	1 year after completion	2 years after completion	3 years after completion
Number of video programmes produced (number/year)	200	200	159	72	117	351

*Note: Number of videos produced in 2016-17 was as of February 16th, 2017. Financial year of IGNOU is from April to March following year.

Source: Figures of the baseline and the target were from the preparatory study of the project. Actual figures were documents provided by EMPC.

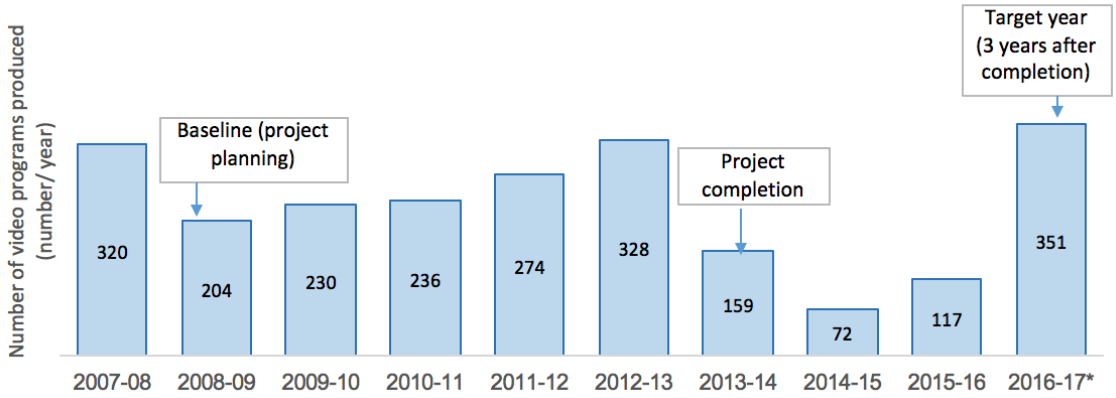

Figure 5 Number of video programmes produced (number/ year)

*Note: Number of videos produced in 2016-17 was as of February 16th, 2017.

Source: Document provided by EMPC

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

EMPC is producing video programmes in response to requests from the Schools of Studies. The requests increase especially, for example, when new courses are being formulated. Requirement for production of video programmes also increases when new educational programmes are commenced in accordance with the policy of the supervising authorities, including the Ministry of Human Resource Development. In this way, the number of video programmes produced by EMPC depends on requests from the Schools of Studies and national policies for the educational sector.

For three years after the project was planned in 2008, the number of video productions had been on an increasing trend. This was mainly due to commencement of new courses. As mentioned in the section of Relevance, distribution of video programmes almost ceased from October 2013 to May 2016, when several functions and courses of the university were stopped because of a review of functions of the university. It is due to this that the number of productions for the period from 2013-14 to 2015-16 is lower than that at project planning and completion.

The need for production of video programmes increased again in 2016-17, at the time of the ex-post evaluation. The actual number of productions for the year was as many as 351. This was mainly because preparation of Swayam MOOCs was commenced in 2016. IGNOU is going to offer ten courses in Swayam MOOCs. At the time of the ex-post evaluation, EMPC was producing large number of video programmes for these courses by utilizing the equipment introduced by the project.

＜Effect Indicators＞

At the time of project planning, "working days necessary for producing 200 video programmes was reduced from 365 days to 210 days" was proposed as an effect indicator. However, it was found that this indicator is not suitable for measuring efficiency of video production. It is because the working days used as the baseline data, which was 365, does not indicate the exact status of working days necessary for producing video programmes at that time[15]; and efficiency cannot be measured by the number of videos produced and the days needed for that, as the number of days needed to produce a video programme depends on the content of the programme. For reference, the average working days per year for an EMPC staff at the time of the ex-post evaluation was 210, the same as the standard working days in the country.

Therefore, in the ex-post evaluation it was decided that improvement of efficiency in production of video programmes, which was the objective of the project, shall be used as an effect indicator for this project. A questionnaire survey[16] and interview survey[17] were

[15] When the external evaluator asked the Director of EMPC about the number of working days of the staff at the time of project planning, he replied that "365 days in average" would be a misunderstanding, although satellite TV and FM radio were broadcast even on Saturdays and Sundays in those days, and the staff in charge of the broadcasting had to attend the work in turn.

[16] The external evaluator distributed questionnaire forms to all the 21 staff of EMPC who were involved in video production and had been in office for 4 years or more at the time of the ex-post evaluation (6 females and 15 males).

conducted with staff of EMPC to find out the status. It was found in the questionnaire survey conducted for 21 production and technical staff of video programme of EMPC that 91 percent of respondents stated that "Work efficiency of video production was improved as a result of the introduction of the new equipment" (Figure 6). They also appreciated that the technical specification of the new equipment procured by the project was satisfactory, and the equipment fulfils their needs in production. (Figures 7 and 8)

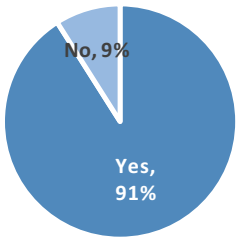

Figure 6 "Was work efficiency of video production improved as a result of introduction of the new equipment?"
(n=21, production and technical staff for video programme)

Figure 7 "Are you satisfied with the technical specification of the new equipment?"[18]
(n=10, technical staff for video programme)

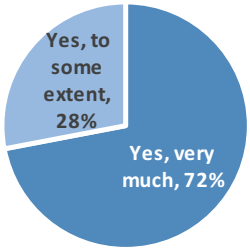

Figure 8 "Does the new equipment fulfil your needs in video production?"[19]
(n=18, production staff of video programme)

Source: Beneficiary survey

During the interview survey, the staff of EMPC mentioned the following examples of improvement of work efficiency in production of video programmes:

<Virtual Studio System>

- We do not have to build and install a studio set after the introduction of the virtual studio system. The number of days needed for preparation of the recording decreased on average at least to one-third, although we cannot exactly

A video programme for the food science course produced with the virtual studio system

She requested them to fill in the forms, and collected them subsequently. Among the 21 staff, there were 11, 3 and 7 who were engaged in production, technical matters, and both production and technical matters for video production respectively. Therefore, the number of replies to the question shown in Figure 7 was 10 (technical staff), and those for the question shown in Figure 8 was 18 (production staff).

[17] A group interview was held for 17 out of the 21 EMPC staff who were engaged in production of video programmes and reported for work on the day of the interview.

[18] There were five options for the question: "I'm very much satisfied", "I'm satisfied", "I'm not satisfied very much", "I'm not satisfied at all" and "I don't know".

[19] There were five options for the question: "Yes, very much", "Yes, to some extent", "No, not much", "No not at all" and "I don't know".

mention how many days were saved as the time needed for building a set depends on what it is.

- It was necessary to procure materials, such as wood and others, to build a studio set. It was costly, too. We had to wait until necessary approvals were given after we submitted a budget proposal for material procurement. The virtual studio system does not require any cost, and there is no need to apply for budget and wait until approval is given.
- We needed to discard the studio sets after use. Another advantage of the virtual studio system is it does not generate any waste.

< Non-linear editing system >

- Editing work became efficient through introduction of the non-linear editing system. Before the project, we used to do linear editing, copying pictures from one video tape to another using more than two video cassette recorders. We can select the necessary parts to be edited easily after the introduction of the non-linear editing system. We can add, delete and replace video data in a moment.

<No inconvenience due to breakdown of the equipment>

- We used old equipment before the project. There was inconvenience in production of video programmes as the equipment was sometimes out of order. We do not have this inconvenience after renewal of the equipment by the project.

In this way, work efficiency in production of video programmes was improved because of the equipment procured by the project; therefore, the effect indicator was achieved.

3.4 Impacts

3.4.1 Intended Impacts

It was expected that usage of the video programmes would expand as an impact of the project. As shown in Table 4, the number of Schools of Studies using video programmes, and the number of video programmes in the library - that is, the total number of video programmes produced so far - had increased. The video programmes are uploaded in Swayam MOOCs, for which test broadcasting started in 2017; and are broadcast in Swayam Prabha[20], which is a new dedicated educational satellite broadcasting channel introduced by the government of India in 2016 as well.

However, the number of copies of video programmes distributed has been decreasing. Until several years ago, IGNOU copied the video programmes to video CDs and DVDs and distributed them to the Regional Centers and Learner Support Centers. In those days, students watched the programmes in groups at the centers. However, satellite TV broadcasting receivers, computers and internet facility became widely available in people's homes in recent years; it became popular for students to watch video programmes at home by using the equipment and communication facility. Therefore, it became less meaningful for the head office of IGNOU to

[20] Swayam Prabha is a new DTH (Direct-to-home) satellite broadcasting hosted by the Ministry of Human Resource Development. There are 32 channels which are showing a series of lectures for students. Test broadcasting was on air at the time of the ex-post evaluation in February 2017.

distribute video programmes to the centers uniformly. The uniform distribution of video programmes to the centers was discontinued as a result.[21]

IGNOU established a digital video library called eGyankosh on the website of the university in 2015 to meet the needs of the students who wished to watch video programmes through the internet. It contained more than 27,000 items in total at the time of the ex-post evaluation.[22] In addition to the video programmes produced by EMPC, assignments and workbooks of academic courses of the university were uploaded. The students can access these materials by inputting their e-mail address and password to the website. As mentioned earlier, distribution of the video programmes by eGyankosh stopped in October 2013, because several functions of the university were under review. During this period, the Schools of IGNOU uploaded a lot of their current video programmes to YouTube, to fulfil the needs of students wanting to watch the video programmes. These uploaded video programmes are now gathered in the "Video archive (YouTube)" in the website of the university.

Table 4 Indicators on utilization of the video programmes

Indicators		Baseline (2008-09)	At the time of the ex-post evaluation (November 2016)
Number of School of Studies using video programme		15	21
Number of video programmes in the library	Master video for academic programme	3,200 pcs.	4,734 pcs.
	Tele-conference recorded	3,853 pcs.	9,000 pcs.
	Programmes purchased from other institutes	400 pcs.	650 pcs.
	Total	7,453 pcs.	14,384 pcs.
Number of copies of video programmes distributed	Distributed to Regional Centers and Learner Support Centers (video CDs)	3,600 pcs.	No uniform distribution to the centers
	Sales to students (video CDs or DVDs)	5,000 pcs.	Around 120 pcs.

Source: Source of the baseline figures is the preparatory study of this project; and the figures at the time of the ex-post evaluation is the document provided by EMPC.

In summary, the use of video programmes produced by EMPC expanded in various ways. It can be said that the project enabled EMPC to continue production of video programmes, and created an impact of expansion of the usage of video programmes.

This project aimed to support learning of students of the university by promoting usage of video programmes. Therefore, the ex-post evaluation tried to understand the way in which the video programmes support students' learning, to confirm the relationships between the project and the learning of the students.

Among many Schools of Studies of the university that utilize the video programmes, the Schools of Agriculture, Health Science, and Sciences seem to utilize them most actively as these are some of the schools that place more emphasis on practical lessons in addition to

[21] EMPC sells DVDs and video CDs of the video programmes if the students and the centers request them.
[22] List of contents of the eGyankosh (http://egyankosh.ac.in/), accessed on March 12, 2017.

theoretical ones. In the ex-post evaluation, the external evaluator conducted interviews with teaching staff working at the head office of IGNOU who are engaged in development of study materials and monitoring of the academic courses conducted by these schools. As a result, the following examples were found to show that the video programmes support students' learning:

＜An example from the School of Agriculture＞

IGNOU actively offers opportunities for vocational training and training for starting businesses. For example, there are courses of three-month duration conducted by the School of Agriculture, with collaboration of the Ministry of Agriculture, for vocational skill development. "Awareness Programme on Dairy Farming for Rural Farmers" aims to support self-employment of the youth. "Awareness Programme on Value-Added Products from Fruits and Vegetables" aims to support farmers, people engaging in food processing and rural youth, who wish to engage in agriculture or food processing. Figures and photos were abundantly used in the textbooks of these programmes, because it is essential to understand practical lessons in these programmes and there are students who are not very proficient in English or Hindi. Moreover, the teachers place emphasis on video programmes for assisting understanding and learning of students, especially in lessons about production and processing as they can show pictures with movement.

A scene in the video programme for "Awareness Programme on Dairy Farming for Rural Farmers" (Artificial insemination)
Source: IGNOU Archive（YouTube）

＜An example from the School of Health Science＞

The School of Health Science utilizes video programmes positively, especially for clinical education. The external evaluator watched a video programme on clinical education for the Post-Doctoral Certificate in Dialysis Medicine. This was a video showing scenes from an operation on kidney disease and dialysis, teaching their process and points to remember. According to the producer of EMPC, who produced this video programme, video programmes are crucial for explaining medical equipment and teaching treatment techniques, and assisting understanding of students, because textbooks often cannot explain these matters sufficiently.

3.4.2 Other Positive and Negative Impacts

There was no impact on the natural environment, resettlement or land acquisition by the project.

This project has mostly achieved its objectives. Therefore, effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

EMPC is an institute attached to IGNOU both at the time of project planning and the ex-post evaluation. There was no significant change in the number of staff (around 100) and organization structure of EMPC at the time of the ex-post evaluation, compared to the time of project planning. Places of responsibility of operation and maintenance of the equipment are clear. There was no vacancy in the managerial posts of EMPC. There have been no problems with operation and maintenance of the equipment procured by the project due to staff shortages. There is no full-time post for editors of the video programme, therefore external personnel are currently engaged on a part-time basis for this work. EMPC has a large amount of editing work at the moment due to the need to produce video programmes for Swayam MOOCs. As this situation will continue for some years in future, EMPC is proposing the university to employ three full-time editors to accelerate and stabilize the editing work.

As mentioned earlier, for around three years after completion of the project the system for distributing video programmes produced by EMPC was minimized. However, eGyankosh, the facility for students to watch video programmes through the internet, was re-activated on an instruction from the Ministry of Human Resource Development in February 2016. Distribution of video programmes by Gyandarshan, the national satellite terrestrial TV broadcasting, is likely to be re-activated in June 2017. Distribution of video programmes by Swayam MOOCs and Swayam Prabha started from 2017 and 2016 respectively. In this manner, the system for distributing video programmes of IGNOU was re-expanding at the time of the ex-post evaluation. (Table 5)

Table 5 Status of distribution of video programmes

Items		At the time of completion of the project (July 2013)	After completion of the project (August 2013 onwards)	At the time of the ex-post evaluation (February 2017)
Satellite broadcasting	Gyandarshan 1[23]	Available 11 hours per day	Off air from June 2014	IGNOU has signed an MOU with the national satellite broadcaster for reactivation. Likely to be reactivated in June 2017.
	Gyandarshan 2[24]	Available 9 hours per day	Off air from June 2014	
	Doordarshan 1[25]	Available 30 minutes per day	Available 30 minutes per day	Available 30 minutes per day
	Swayam Prabha (DTH satellite broadcasting)	Not available	Not available	A new programme. Test broadcasting was started in December 2016.
Internet	eGyankosh	Accessible	Disconnected from June 2014	Became accessible from February 2016. Functions and contents are being expanded.
	IGNOU archive (YouTube)	Accessible	Accessible	Accessible
	Swayam MOOCs	Not available	Not available	A new programme. Test use was started in January 2017.

Source: Document provided by EMPC

As mentioned in the item of Relevance of this report, the beneficiary survey found that 80 percent of current students who participated in the interviews (61 persons) had not watched a video programme. 71 percent (45 persons) replied that they did not know there was a video programme when asked about the reason for not having watched a video programme. (Figure 9) There is a mention in the course guidance of IGNOU that video programmes are available on the IGNOU website and satellite broadcasting. However, there is no detailed information on it, such as titles and contents of the course- and curriculum-related video programmes and broadcasting schedule. Video programmes were rarely introduced or promoted in the weekend counselling sessions. It was acceptable that information about availability of the video programmes was not provided to the students widely because the predominant means of their distribution was not functioning at this time, as shown in Table 5. However, there is a need to improve the system for providing information about the utilization of the video programmes when distribution re-starts.

[23] Gyandarshan is a national satellite terrestrial TV broadcaster in India. IGNOU and other universities are offering programmes to Channel 1.
[24] Channel 2 is a dedicated channel for IGNOU. Only IGNOU is offering programmes for the channel.
[25] Indian national terrestrial DTH satellite broadcaster. DTH satellite broadcasting is widely used in India.

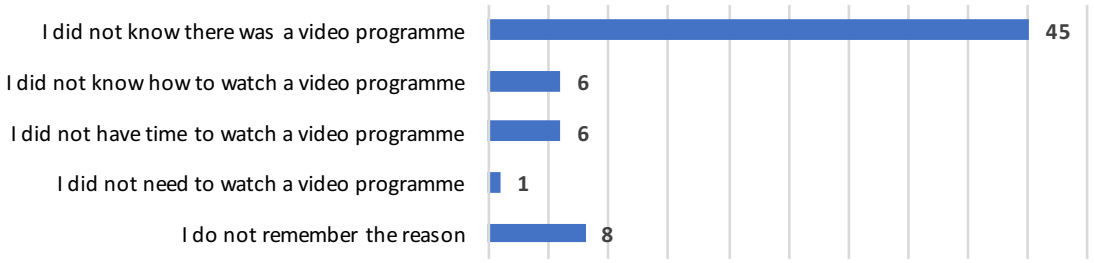

Figure 9 "What are the reasons why you have not watched a video programme?"
(n=61, multiple answers allowed, current students who have not watched a video programme)
Source: Beneficiary survey

3.5.2 Technical Aspects of Operation and Maintenance

Graphic, Engineering and Camera Units of EMPC were operating the equipment procured by the project at the time of the ex-post evaluation. Maintenance of the equipment was conducted by the Maintenance Section of the Engineering Unit. Staff of EMPC have mastered basic operation of the equipment. There have been no problems due to technical issues.

EMPC has conducted training programmes after completion of the project by inviting specialists in various subjects according to the need, as shown in Table 6, for improving technical level of the staff.

Table 6 Staff training programmes conducted after completion of the project

	Topics of the training	Duration	Trainer
1	Video production by HD camera	1 week	An eminent HD cameraman
2	Sound recording and mixing	3 days	A university professor
3	Aesthetics of Programme Production, Research and Technology Upgradation of educational Television	7 days in total	A Vice-President, Discovery Channel
4	Trouble-shooting of virtual studio system	1 day	A well-known film maker

Source: Document provided by EMPC

The project introduced digital HD equipment, while most of the equipment owned by EMPC before the project was analog SD (standard definition). Digital HD equipment was introduced because there was a world trend of audio-visual equipment changing from analog SD to digital HD at that time. EMPC did not experience a problem in transferring analog SD to digital HD. They are using both systems according to the need at this moment. EMPC has produced 395[26] and 322 video programmes by using digital HD and analog SD equipment respectively during the time from completion of the project to the ex-post evaluation in February 2017. The staff mastered basic operation of the virtual studio system. They have produced video programmes by using the facility. However, according to staff of the Engineering Unit, they have currently

[26] In addition to this, there were 605 video programmes that were recorded by digital HD and scheduled to be edited.

mastered only some of the functions of the software for the system out of a diversity of them. They feel a need of technical training on the system because of this. EMPC was proposing the training institute of the Indian National TV Broadcasting, OEM[27] agencies and others to conduct training programmes for further improvement of their technical skills in operation and maintenance of HD video equipment, including the virtual studio system.

In summary, currently the staff of EMPC have basic technical skills to utilize the equipment procured by the project; several measures are being taken to further improve their skills. Therefore, there was no problem of sustainability in terms of technical aspects.

3.5.3 Financial Aspects of Operation and Maintenance

Like other national universities, the principal revenue of IGNOU is the programme fees paid by students and budget allocation from the Ministry of Human Resource Development. IGNOU has obtained a stable revenue in recent years. The total amount of revenue of IGNOU in 2014-15 was approximately INR 5.7 billion (approximately JPY 9.9 billion[28]). It is apparent that revenue from programme fees plays an important role in the operation of IGNOU from the fact that 68 percent of total revenue was generated by programme fees paid by students in the respective year (Figure 10). The number of students and academic programmes of IGNOU was increasing or stable in recent years; therefore, IGNOU can also expect a stable amount of revenue in future. The Ministry of Human Resource Development places importance on open and distance education. Therefore, it is expected that they will also continue to allocate the necessary budget to IGNOU in the future. Expenditure of IGNOU is in accordance with the revenue every year (Figure 11). From these facts, there is no problem with the financial prospects of IGNOU.

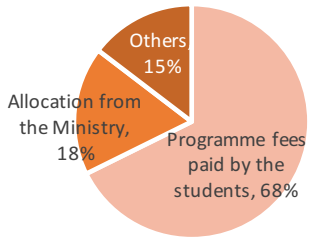

Figure 10 Revenue of IGNOU (2014−15)

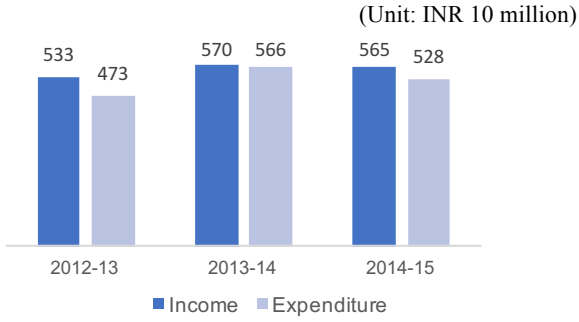

Figure 11 Revenue and expenses of IGNOU in recent years

Source: Document provided by EMPC

The necessary budget was allocated to EMPC for production and broadcasting of audio-visual programmes every year. The budget allocation of 2016-17 was INR 480 million

[27] OEM stands for Original Equipment Manufacturer.
[28] Converted at IMF rate on April 2nd, 2014 (1USD=59.65INR=103.85JPY).

(approximately JPY 810 million[29]). Budget for maintenance of the equipment and capacity development of the staff has been allocated every year (Figure 12). The amount of expenditure was very low compared to budget allocation in recent years (Figure 13) because there was no expenditure for satellite TV broadcasting and FM radio transmission, as distribution of the video programmes by these media was not in operation.

(Unit : INR1000)

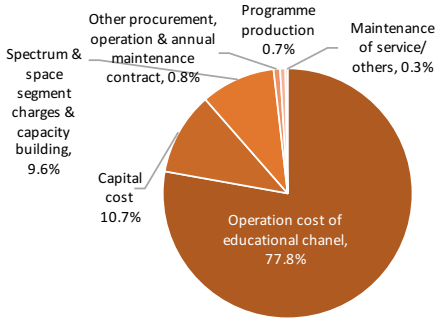

Figure 12 Budget allocation of EMPC (2016-17)

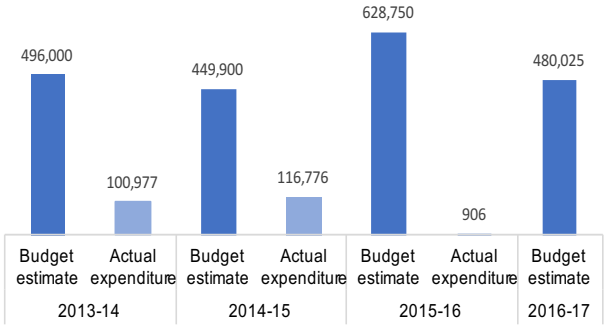

Figure 13 Revenue and expenditure of EMPC in recent years

Source: Document provided by EMPC

EMPC did not experience any financial problems regarding the operation and maintenance of the equipment procured by the project. In this manner, there were no problems in terms of financial aspects of IGNOU and EMPC.

3.5.4 Current Status of Operation and Maintenance

Most of the equipment introduced by the project was utilized well continuously. The status of maintenance was also satisfactory. Repair work was underway for the lighting system for the virtual studio and the multi effect video server system, as some of the functions of the equipment were not working.

The automated dimmer system for the lighting system for the virtual studio stopped working after they used it for nearly two years. EMPC was advised to operate the lighting system manually by the manufacturer in Japan after an e-mail exchange, since there is no local agent of after-sales for the equipment. However, manual operation is inconvenient, since they need to bring down the lighting system from high ceiling. They obtained a cost estimate for repair of the automated dimmer system from the manufacturer; they found it was very expensive as it included the cost of Japanese technicians visiting India. As an alternative, EMPC is arranging to repair the equipment through a local company specialized in lighting systems. EMPC is planning to request the Japanese manufacturer to appoint the local company as their local agent, and to purchase the necessary parts from Japan through them, and repair the equipment by receiving their technical assistance.

[29] Converted at IMF rate on April 2nd, 2016 (1USD=66.24INR=111.50JPY).

A part of the multi effect video server system stopped working due to a problem with its hardware. EMPC has been using the server by using an external hard disc instead of the central storage server in the system. At the time of the ex-post evaluation, EMPC has secured the necessary budget and called an agent for repair of the equipment; the repair work will be completed very soon.

Staff of the Engineering Unit of EMPC conducted daily or weekly visual inspections, checking basic functions, and collecting data on the status of running the equipment by taking turns. They had conducted inspection and maintenance using the measuring equipment, although it was not on a routine schedule.

EMPC was making necessary arrangements for an annual maintenance contract with agents of the manufacturers of the equipment at the time of the ex-post evaluation. EMPC had not signed an annual contract for such maintenance although they had considered about the necessity of it since 2015, because the cost of the annual maintenance contract was high and the equipment was not used very frequently at that time. Instead, they requested the agents to conduct inspections and repairs when necessary. EMPC started considering the need for a contract again in 2016, as the equipment was used more. There was a discussion at the technical purchasing committee of the university in January 2017. Thereafter, the Vice Chancellor of the university approved to have the contract. EMPC was working on a tender procedure as of March 2017.

As explained, most of the equipment procured by the project was utilized well continuously. The equipment that had had problems was in the process of being repaired. EMPC was taking the necessary steps for signing an annual maintenance contract with agents for the manufacturers. Therefore, there was no problem with the status of maintenance and management of the equipment.

As explained, there was no problem with the operation and maintenance of the equipment introduced by the project in terms of institutional, technical and financial aspects; most of the equipment is utilized effectively. There is a prospect that the equipment will be used effectively in future. Therefore, sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented to improve the efficiency and quality of video programme production for students of IGNOU in India, by renewing and digitalizing the equipment necessary for production of videos; thereby contributing to the students' learning and expanding usage of the video programme of the university.

The project has been highly relevant to the development plan of India, which aims to improve the enrollment rate in higher education and to promote distance and open education; to the development needs of EMPC. EMPC, which is attached to IGNOU and engaged in production of audio-visual programmes, needed to maintain and enhance its capacity to produce

videos that would meet the needs of students who want to watch video programmes. The project has also been highly relevant to Japan's ODA policy, which places importance on assistance that increases educational opportunities for poor and socially vulnerable people. Therefore, the relevance of the project is high.

Procurement of equipment was conducted as planned. Although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.

At the time of the ex-post evaluation, EMPC was producing more than 200 video programmes per year, which was the target figure for the project. Efficiency of video production had improved as a result of equipment procured by the project. Impacts of the project include expansion of the usage of the video programmes produced by EMPC in various ways. For example, video programmes were uploaded to the digital library on the IGNOU website, and distributed through the online programme and satellite broadcasting programme, which were newly introduced by the Indian government. Therefore, the effectiveness and impact of the project are high.

There were no problems with the operation and maintenance of the equipment introduced by the project in terms of institutional aspects. Staff of EMPC have the basic technical know-how to utilize the equipment introduced by the project, and have taken necessary measures for further improvement of techniques. There was no problem with the financial status of IGNOU or EMPC. Most of the equipment procured by the project was continuously utilized well. Repairs were being arranged for any equipment that had problems. EMPC was taking necessary steps to arrange an annual maintenance agreement. In this way, there were no problems with the operation and maintenance of the equipment introduced by the project in terms of institutional, technical and financial aspects. Therefore, sustainability of the project effects is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) It is recommended that EMPC acquire advanced technical know-how on operation, maintenance and repair of the virtual studio system and digital HD equipment by arranging more frequent technical training, so that the equipment would be utilized more, and production of video programmes would become more efficient.

(2) There seem to be many students of IGNOU who are not aware of the availability of video programmes. It is advisable that EMPC discuss this with senior management of the university, and facilitate them to disseminate more detailed information about course-related video programmes to the students soon after the re-activation of Gyandarshan (Satellite TV broadcasting) and full operation of Swayam MOOCs and Swayam Prabha channels.

4.2.2 Recommendations to JICA

It is recommended to make sure of the status of utilization of the equipment introduced by the project for some more years by obtaining information from EMPC, such as the number of video programmes produced per year, progress on the re-activation of satellite broadcasting, trend of new programmes, etc.

4.3 Lessons Learned

(1) Make sure of the availability of local agents for after-sales support service

EMPC had to spend a long time repairing the automated lighting system introduced by the project, as there is no agent of the Japanese manufacturer of the equipment in the country. There might be no local agent to provide after-sales maintenance support services for professional equipment of new technologies for some time until a technology becomes widely used in a country of the executing agency. The cost of maintenance support services from Japan is expensive, and not affordable for executing agencies, which are public institutions in developing countries most of the time. Therefore, at the time of selecting equipment in a grant aid project, JICA needs to make sure of the availability of local agents or professional companies with adequate technical capacity that can provide after-sales support services for all the equipment. It is always best to select equipment for which after-sales support services are available locally; however, if it is not, JICA needs to make necessary arrangements with consideration that such services will become necessary.

(2) Expedite implementation procedures of the project, including issue of Authorities to Pay

The planned project period of this project was fifteen months; whereas it was actually thirty-five months. The main reason for this long delay was a delay by the ministry that supervises IGNOU in issuing the Authorities to Pay. This was probably because the ministry did not have a strong sense of ownership of the project.

As with this project, when the institution responsible for conducting various procedures of the project is different from the executive agency of the project, it is important to involve the former in the project from the time of planning; to create a sense of ownership for the project; and to make them fully aware of their responsibility in the project and the procedures they need to implement for it, so that the project can be implemented speedily. It is also a good idea to appoint a senior officer to be in charge of the project, to clarify who is responsible for what in the institution, and to establish a structure to conduct the procedures of the project efficiently.

JICA Evaluation Department

On the Views of an Expert

In addition to performing an evaluation based on the five DAC evaluation criteria by the external evaluator, this ex-post evaluation incorporated the views of an expert in order to reflect more specialized and diverse views. The external evaluator selected the expert and gained cooperation from Hisashi Nakamura, Honorary Professor of Ryukoku University, Japan.

Prof. Hisashi Nakamura is an economist specializing in South Asian Studies. He has been a professor of the Faculty of Economics of Ryukoku University, and an affiliate professor of the Center for Southeast Asian Studies of Kyoto University. He is currently a Research Fellow of Ryukoku University. He has taught in Delhi University and Jawaharlal Nehru University in India, and has worked hard for popularizing correspondence study courses for post-graduate education in Japan.

He has written books such as *Accumulation and Interchange of Labor*, *Affluent Asia and Unhealthy Japan*, *Economics of Local Self-reliance* and *Problems of Asian People* and others.

IGNOU, which was assisted by the project, aims to provide people of various ages, professions and economic background with the opportunity of higher education; contributes to eradicating educational difference in India; and increases the enrolment rate of higher education of the country. This is a very important background and reason for JICA to conduct this project as grant aid assistance.

The analysis by the expert was conducted with the aim of facilitating understanding of the background of the project for those who read this ex-post evaluation report, including the general public. The methodology adopted for the analysis included interviews with students of IGNOU at the Regional Center of Delhi III and the Learner Support Center in Delhi Prison; exchange of opinions with and information collection from the Directors and teachers of the Schools of Agriculture, Business Management, Computer Science and Management, and Health Science, etc., and Director of Student Service Center of IGNOU and staffs of EMPC; and a review of relevant documents.

The column in the attachment is a summary of the results of the analysis.

Attachment

＜Column: Analysis of the Project by the Expert＞

Meritorious Aspects and Challenges of IGNOU

Hisashi Nakamura
Honorary Professor of Ryukoku University, Japan

1. Higher Education in India

I visited the campus of IGNOU head office in suburbs of south New Delhi, the capital city of India, in November 2016. It is the university of the national government for distance and open education established in 1985, and was named after Prime Minister Indira Gandhi.

Prof. Nakamura having an interview with students at IGNOU Regional Center, Delhi III

Near IGNOU there is a large campus of Jawaharlal Nehru University, which was named after her father. This is an elite university, which has produced a number of high-level officials and diplomats of the national government of India. On the other hand, IGNOU is a higher education institute, which offers degrees through distance education to people around the country, including those who do not have an opportunity to attend universities due to various reasons.

Indira Gandhi visited Japan in 1957 along with her father. I remember having a glimpse of her across a road when she was in a group of visitors, who came to see Nishijin-brocade in Kyoto. She was in sparkling young age, which was very impressive especially in contrast with Nehru, who was in advancing old age. I saw her again 10 years later when I visited New Delhi in 1967. She was presiding over the Republic Day as prime minister on January 26th. She was getting gray hair, probably as a result of ten years of hard work. Her hooked nose made her expression look sterner.

Ten years later, in 1979, I listened to her speak at a political assembly of the Indian National Congress when I was staying at Ashoka Hotel. She stated she would like to place more emphasis on higher education in educational policy, rather than primary and secondary education. She said she did not have adequate time for school education when she was small. She recalled that she was studying through letters sent to her from her father in jail. She further added that one can study reading/writing and calculation from your parents or siblings, or elders in villages and monks in temples. However, one cannot study advanced mathematics or quantum mechanics if you do not have access to a specialized higher education institute. I found this idea contrasted with modern Japanese educational policy, which invested most of the national budget in primary and secondary education, and did not place much emphasis on university education.

Her father, Nehru, also placed great importance on higher education, especially in science and technology. As a result, we can find a lot of Indian professors or scholars playing important roles in renowned universities in the U.S.A or the United Kingdom. Technology-related universities of India, such as the Indian Institute of Technology, are very popular among multinational companies. It is said that half the senior management of companies in Silicon Valley in U.S.A. are Indian nationals.

2. Minimize social disparities in intellectual field

As explained, while universities in India are producing talented human resources working all over the world, there are still many young people in the country who have no opportunity to study in a higher education institute. India still has social disparities, especially in the intellectual field. Brahmins, who are at the top of the caste system, used to occupy important positions in the intellectual field, not in fields of military and business affairs. After independence from the status of British colony, India enacted a new constitution and banned the caste system. However, there was a strong influence from the caste system when I visited the country for the first time in 1965. Most of the university professors and high-ranking government officials were Brahmin, who occupied less than 10 percent of the total population.

According to the constitution, scheduled castes and scheduled tribes, who are around one quarter of the total population, should be provided constitutional protection. However, there was a big difference between what was mentioned in the law and what these people were actually experiencing in daily social life. Minimization of social disparities has been one of the most important policy objectives for every government since Independence.

Establishment of IGNOU is a part of the effort for achieving this policy objective. It was established as a university so that a large section of the population, who did not have many educational opportunities, could obtain degrees even without attending schools. It is the university that is responsible for realization of the crucial policy of the second Indira Gandhi government, “Garibi Hatao (poverty eradication)” in the field of higher education, and is taking care of various difficulties in Indian society.

3. Advantages of studying in IGNOU

I was amazed to see the scale and diversity of the university when I visited the campus of IGNOU. Since its initiation, IGNOU has been expanding the Schools of Studies, area of specialties and geographical areas. It has various academic programmes ranging from certificate, Bachelors and Masters degrees, M.Phil. and PhD programmes. The number of students at the Open University of Japan is around 70,000, whereas that of IGNOU is more than 3 million. IGNOU is one of the largest institutions for open and distance education in the world.

I had an opportunity to interview some students by visiting IGNOU Regional Center, Delhi III during the field visit. IT was a popular subject among the students. Many of the students whom I interviewed were in their 30s. There were students who were studying while working. I was impressed by their self-motivated and positive manner to study. It was also found in the

beneficiary survey that was conducted to the students as part of the ex-post evaluation that "I can study while I am working" was the most popular answer when they were asked about the advantages of studying in IGNOU.

What impressed me above all was the IGNOU Learner Support Center located in Delhi prison. IGNOU was offering several programmes that can be learned by self-study with textbooks to obtain degrees and certificates. The students majored in political science, language and others. Some of them were studying more than one programme. Course fees were exempted until such time as they complete the period of sentence and leave the prison. There was a practical course on vehicle maintenance that can help their vocational rehabilitation. These courses were offered so that they can continuously study, starting from Bachelor's degree and proceeding to Master's degrees and PhD, so that they can spend their life in the prison meaningfully even they might have a long period of sentence or have little hope to be released. I was convinced through discussion with the students that the study at IGNOU made their life in prison positive.

The programme fee of IGNOU is around INR 10,000 (approximately JPY 17,000); this is very reasonable, although it depends on the kind of programme being followed. Degrees of IGNOU are recognized in all universities in India. A mutual recognition system of course records with other conventional universities is applicable for students of IGNOU. They can apply for the scholarship loan facility offered by the federal government. IGNOU offers learning opportunities to Indian nationals living abroad and foreign students living in India.

According to the policy instruction of the constitution, IGNOU reserves a certain percentage of available seats for students of scheduled castes and tribes, other backward classes, handicapped, bereaved families, Kashmiri refugees and others. There are special systems for exemption of programme fees and free scholarship programmes for the above-mentioned groups.

As a result of these eminent efforts, in 1999 IGNOU was selected as "the best institution implementing distance education in the Commonwealth countries" by the Commonwealth of Learning, which is promoting distance and open education in the Commonwealth countries. In 2010 UNESCO certified IGNOU as being "the largest higher education institution in the world".

4. Roles of the audio-visual programmes in learning in IGNOU

Students of IGNOU are mainly studying by using self-learning materials (textbooks) and participating in counselling sessions during weekends. Attendance in the counselling sessions is not compulsory. That means one can obtain a degree without attending any of these sessions. In other words, there is no face-to-face class, which is compulsory in the corresponding education of the Open University of Japan. However, in India traditional education was carried on the tradition of master-pupil relationship, in which pupils learn from their teacher directly, since the ancient time of Rigveda. The basis of learning is recitation by word of mouth, not like the learning from classical writings conducted in Chinese Civilization. Learning meant deepening

the relationship between master and pupils. This is completely different from the education method of IGNOU.

There will be a chance to create a new tradition in Indian higher education when learning at IGNOU is further popularized. However, it seems that many years will be needed to create the new tradition. In fact, many students, teachers and administration staff of IGNOU recognized it as a disadvantage that students do not have sufficient communication with their teachers. In the beneficiary survey, a lot of students pointed out "limited communication with teachers" as a disadvantage of IGNOU.

Audio-visual programmes play an important role in supplementing the above-mentioned limited communication between teachers and students. There are various means of distribution of the video programmes. Earlier, students mainly watched the programmes on cassette tapes and video tapes in groups at Learner Support Centers and Regional Centers. Recently students watch the programmes more often through satellite TV broadcasting, FM radio, internet and YouTube. A test programme was introduced that broadcasts lectures through the internet radio system, to which students log in from the IGNOU website, and send any questions to the teachers conducting the lecturers by using online chat. In this way, audio-visual programmes and communication technology enabled interactive communication, in which students can receive replies to their questions from teachers who they have not in fact met.

In the middle of 2016 the Indian government introduced a massive higher and adult education programme on the internet, Swayam MOOCs, which is a new programme for open and distance education. EMPC was producing video programmes for Swayam MOOCs at a fast pace by using the equipment introduced by JICA at the time of the ex-post evaluation. Swayam MOOCs is a new system through which anyone can learn or obtain degrees, beyond the bounds of the universities. I received the impression that this is an effective attempt in a country like India, which has a vast territory and large population, to increase the enrolment rate of higher education. It will be interesting to see the successful achievement of Swayam MOOCs in future in India.

5. Future Challenges in Management of IGNOU

The number of students of IGNOU has increased to 3.1 million in 2015. This is a good thing, as the university is reaching those previously unreached, who rarely had an opportunity for higher education; this is the aim of the university.

However, there is a risk for any organization when it becomes huge. There may be a risk of extreme centralization of power in university management, in consequence of seeking operational efficiency of many Learner Support Centers and Regional Centers located far away. Then there will be a question about the nature of the university, which would normally be an organization that is self-governed by teachers and scholars.

For the smooth operation of the university, it is necessary to promote adequate communication among the administrative divisions, more than twenty Schools of Studies, specialized units, including EMPC, Regional Centers and Learner Support Centers under the

head office. However, there is a concern that this arrangement will be more difficult when the number of these units and centers increases. To avoid this risk, it may be a good idea to transfer part of the administration function to the state-owned open universities, for example, for preventing over-expansion of the administrative set-up. This might contribute to making the status of the state-owned open universities higher.

It is also a good idea to activate research activities by teachers and students, to maintain fundamental characteristics of universities. The principal role of the teachers of IGNOU is to develop learning materials, including textbooks and video programmes, develop new academic programmes, and support learning. They do not have many opportunities for engaging in academic research. It is understandable that the role of teachers of IGNOU, which is undertaking open and distance education, is completely different from the roles in conventional universities, which are education and research. However, research is a lifeblood of a university. It would energize the operation of the university and further uplift recognition of the university once an excellent research outcome is created as a result of enhancing facility for research and experiment, and promoting joint research with students in PhD programmes.

The Republic of the Union of Myanmar

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project
"The Project for Urgent Improvement of Communication Networks"

External Evaluator: Tomoko Tamura, Kaihatsu Management Consulting, Inc.

0. Summary

This project was implemented to enhance capacity of communication services, by improving communication networks in and between the three largest cities in Myanmar, and thereby contribute to economic development and improvement of the living condition of people in the country. The project has been highly relevant to the development plan of Myanmar, which aims to drastically increase the population coverage of communication services; to the development needs of the country, including developing communication infrastructure in line with the increase in the number of users and traffic volume of communication services, and fulfilling communication needs of upcoming international events, such as upcoming the South East Asian Game (SEA Games) at the time; and to Japan's ODA policy, which places importance on the development of infrastructure and institutions necessary for sustainable economic development. Therefore, its relevance is high. Procurement of equipment and capacity building program (soft components) was conducted as planned, and both the project cost and project period were within the plan. Therefore, the efficiency of the project is high.

Improved communication speed of the backbone networks and metro networks of the largest three cities of the country, and improved internet access were realized as planned due to the implementation of this project. After completion of the project, Myanma Posts and Telecommunications (hereinafter referred to as "MPT"), the executing agency of the project, continuously enhanced its facility due to the increase in traffic volume and demand by increasing the capacity of the equipment introduced by the project and purchasing additional equipment. The communication service of MPT has been improved and the equipment has been maintained properly. This project supported the operation of the SEA Games and contributed to raising the international presence of the country. The beneficiary survey conducted in the ex-post evaluation found that the users of communication services in the country had benefited in various ways as a result of this project and improvement of communication infrastructure and services realized after the project, such as improvement in communication with people living far away and in workplaces, increased business chances and opportunities for employment and better jobs. Therefore, the effectiveness and impact of the project are high.

There were no problems with the operation and maintenance of the equipment introduced by the project in terms of institutional, technical and financial aspects; most of the equipment is utilized effectively. There is also a prospect of the equipment being effectively utilized in the future. However, currently the equipment for LTE communication is utilized to a limited extent. Therefore, sustainability of the project effects is fair.

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

1. Project Description

Project locations

Equipment installed by the project (Nay Pyi Taw)

1.1 Background

Development of communication infrastructure was delayed in Myanmar due to many years of import and other restrictions during the time of economic sanctions. Communication services were only used to a limited extent in the country because of insufficient communication network capacity, due to the necessary infrastructure not being developed, and high user fees. The penetration rates of fixed telephones, mobile phones and internet in the country were 3 percent, 5 percent and 0.3 percent respectively in 2011.[1]

The Thein Sein administration, established in 2011, was in a process of political and economic reform and had a policy of improving communication services and citizens' lives, and stimulating economic activities, by opening the communication market to private service providers and relaxing regulations. However, in those days there were frequent problems with connectivity and speed of telephone and internet because of inadequate capacity of the communication network and decrepit communication infrastructure, and other reasons. The administration was worried that the communication environment would worsen in future when traffic volume increased. In particular, improving communication capacity in Greater Yangon, the center of the economy and the entrance of the country, Mandalay, the second largest city, and Nay Pyi Taw, the capital city, where local and foreign firms and government institutions would locate their offices in future, was urgent.

Myanmar was planning to hold the SEA Games in December 2013, and the ASEAN conference in November 2014. It was also an urgent task for the country to meet the communication needs of these international events.

1.2 Project Outline

The objective of this project is to enhance capacity of communication services to meet increasing communication demand, by improving the communication networks in and among the cities of Greater Yangon, Mandalay and Nay Pyi Taw in Myanmar, and thereby contribute to the economic development and improvement of the living condition of people in the country.

[1] Source: Summary of the ex-ante evaluation of the Project for Urgent Improvement of Communication Networks.

E/N Grant Limit / Actual Grant Amount	1,710 million yen/ 1,709 million yen
Exchange of Notes Date/ Grant Agreement Date	December 2012/ December 2012
Executing Agency	Myanma Posts and Telecommunications (MPT)
Project Completion	November 2013
Main Contractors	Sumitomo Corporation NTT Communications Corporation, and NEC Corporation consortium
Main Consultants	The Consortium of Yachiyo Engineering Co., Ltd. (Japan), Pantel International Co., Ltd. (Japan) and Nippon Koei Co., Ltd. (Japan)
Basic Design	November 2012 - March 2014[2]
Related Projects	- ODA Loan: Communication Network Improvement Project (L/A signed in 2015) - JICA Long-Term Expert: Advisor for Improvement of Telecommunication Infrastructure (November 2013 - June 2015) - JICA Long-Term Expert: Policy Advisor for Communication and Information Technology (October 2015 -)

2. Outline of the Evaluation Study

2.1 External Evaluator

Tomoko Tamura, Kaihatsu Management Consulting, Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: July 2016 – July 2017

Duration of the Field Study: October 2nd - 16th, 2016, December 18th - 24th, 2016

2.3 Constraints during the Evaluation Study

Currently MPT is jointly operated with a private company,[3] and does not publicize its

[2] The preparatory study for this project and the ODA loan project of Communication Network Improvement Project was conducted at the same time in "The Preparatory Study on Improvement of Communication Network Projects". The field study for preparation of this project was conducted from December 2012 to January 2013 (the first phase) and in February 2013 (the second phase).

[3] MPT is being operated jointly with KDDI Summit Global Myanmar Co., Ltd. (KSGM) from July 2014. KSGM is owned 50.1 percent by KDDI and 49.9% by Sumitomo Corporation. Staff of MPT and KSGM call the jointly operated firm MPT-JO (JO stands for joint operation). However, MPT and MPT-JO are regarded as the same in this report, and described as MPT, because it is called MPT in public relations material.

financial information. Therefore, financial information of MPT was not provided to the external evaluator for this ex-post evaluation. Sustainability in terms of financial aspects was analyzed based on the result of interviews with senior management of MPT, as quantitative analysis could not be conducted.

3. Results of the Evaluation (Overall Rating: A[4])

3.1 Relevance (Rating: ③[5])

3.1.1 Consistency with the Development Plan of Myanmar

At the time of project planning, completion and ex-post evaluation, the political and economic development policy of the government of Myanmar[6] emphasized the need for reform of information and communication technology, and aimed to radically increase penetration rates of fixed telephones, mobile phones and internet. For example, the policy had a target of increasing the penetration rate of mobile phone from 10 percent at that time to 80 percent in 2015.

Development of communication infrastructure is necessary to achieve these policy objectives. The plan of the communication sector of the country[7] at the time of the ex-post evaluation aimed to increase the population coverage of telephones (mobile and fixed phones), internet and high-speed internet to 90 percent, 85 percent and 50 percent respectively by 2020 by developing communication infrastructure, such as communication networks and international gateways.

Therefore, this project, which aimed to develop communication networks, is highly consistent with the development plan and communication sector plan of the country at the time of planning and ex-post evaluation of the project.

3.1.2 Consistency with the Development Needs of Myanmar

At the time of planning the project, it was expected that the number of users of communication services and traffic volume would increase, and it was urgent to develop communication infrastructure to meet this demand. It was also urgent for the country to develop its communication infrastructure at the time of planning of the project to meet the communication needs of the organizers, participants and media persons of participating countries in international events, such as the SEA Games in December 2013, and the ASEAN conference in November 2014.

After completion of the project, communication services, especially mobile phones, became widely used in the country. According to a survey of the International Telecommunication Union (hereinafter referred to as "ITU"), the subscription rate of mobile phones was 13 percent in 2013 and 77 percent in 2015. In the same way, the penetration rate of individuals using the internet increased from 2 percent to 22 percent (Figure 1). However, these subscription rates for mobile phones and individuals using the internet are still low compared to neighboring South-East Asian countries (Figure 2). There is a high possibility that demand for telephone and

[4] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[5] ③: High, ②: Fair, ①: Low
[6] *Framework for Economic and Social Reforms, 2012*
[7] *Myanmar Telecommunication Master Plan, 2015*

internet will also increase in the future, in line with the economic development of the country. The need to develop communication infrastructure to meet this demand remains high at the time of the ex-post evaluation.

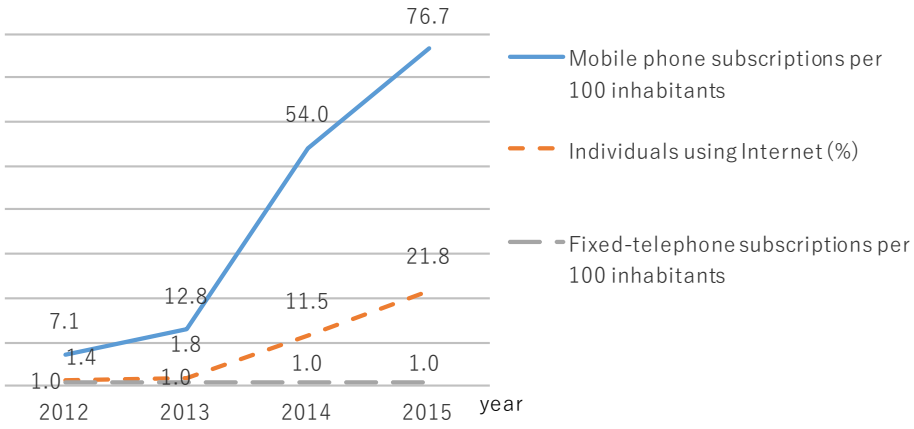

Figure 1 Mobile phone and fixed telephone subscription rates and individuals using the internet in Myanmar in recent years

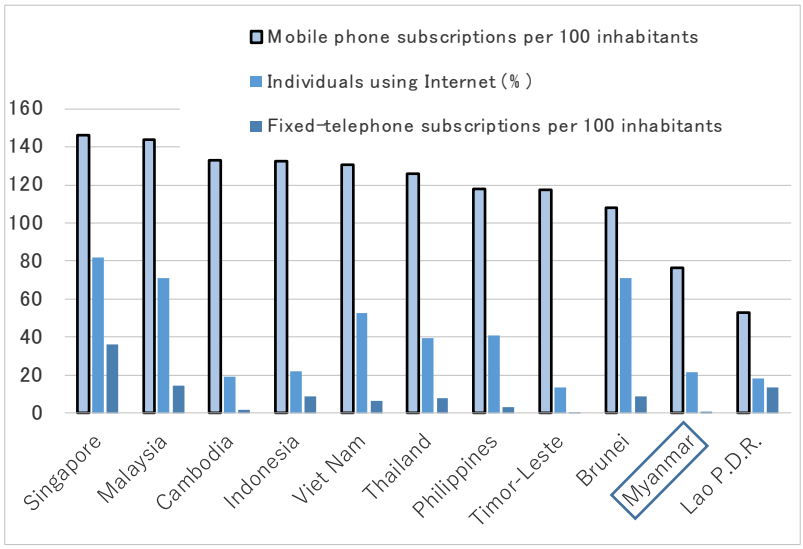

Figure 2 Mobile phone and fixed telephone subscription rates and individuals using internet in South-East Asian countries (2015)

Source: Illustrated by the external evaluator based on the information on the website of ITU (the figures are estimates of ITU)

It was found in the beneficiary survey[8] which was conducted in Yangon, Mandalay and Nay Pyi Taw as part of the ex-post evaluation that users wished to have further improvement of

[8] A street interview survey was conducted in the earlier-mentioned three cities of the users of one of the following communication services - mobile phones, fixed telephones or internet - in October 2016 by using convenience sampling method. The total number of valid responses was 258. The number of city-wide responses was 86, 78 and 94 in Yangon, Mandalay and Nay Pyi Taw respectively. 52 percent were male and 48% were female. 47% were

connectivity of internet and telephone, speed of internet, user fees and others, while they highly appreciated recent improvements in the communication environment (Figure 3). This survey result also shows that the need for further improvement and development of communication infrastructure is high in the country at the time of the ex-post evaluation.

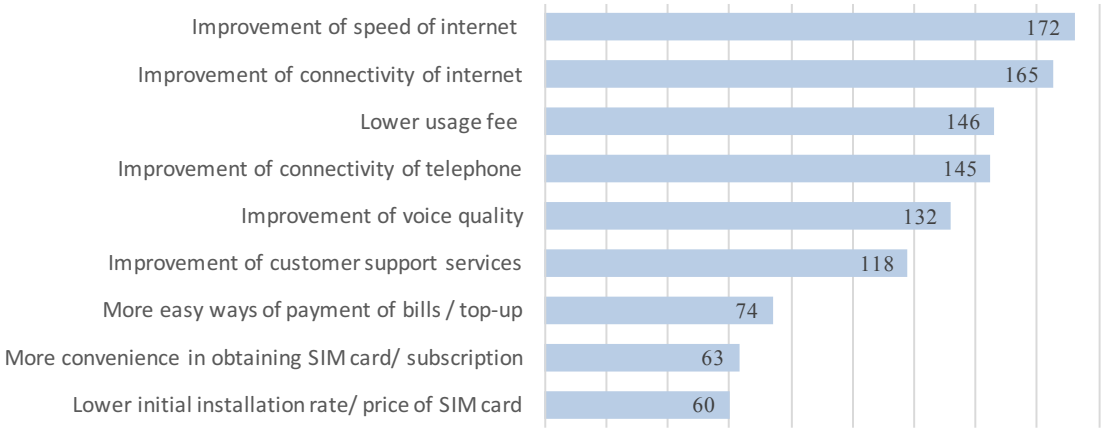

Figure 3 In what kinds of service do you wish to have further improvement in future?
(n=258, multiple answers allowed)

Source: Beneficiary survey

Therefore, this project, which aimed to improve communication infrastructure, was highly consistent with the development needs of the country throughout the period from planning to the ex-post evaluation of the project.

3.1.3 Consistency with Japan's ODA Policy

The Country Assistance Policy of Myanmar, which was revised in April 2012 to facilitate democratization, national reconciliation and sustainable development of the country, listed the following as three important areas of assistance: (a) improvement of living conditions of the people, (b) capacity building of individuals and institutions necessary for supporting socio-economic activities, and (c) development of infrastructure and institutions necessary for sustainable economic development. This project, which aimed to develop communication infrastructure, was part of (c) above. Therefore, this project was consistent with Japan's ODA policy.

This project has been highly relevant to the development plan and development needs of Myanmar, as well as Japan's ODA policy. Therefore, its relevance is high.

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younger than 35 years old and 53% were equal or older than 35 years old. Status of usage of the communication services was that 240 persons (93%), 48 persons (19%), 26 persons (10%) and 8 persons (3%) were using smartphones, mobile phones (voice only), fixed telephones at home and internet facility at home respectively (multiple answers allowed).

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

The output of procurement of the equipment and soft components were as follows. They were conducted in accordance with the original plan.

＜Procurement and installation of the equipment＞

(1) Enhancement of the backbone network between the three cities

The backbone network transmits all the communication services of MPT, including those for internet, mobile phones (both voice and data), and fixed telephones. The project enhanced the capacity of the backbone network from 10Gbps to 30Gbps (10Gbps×3) by installing wavelength division multiplexing systems, power supply systems for the backbone network and others to the existing fiber optic cables between Greater Yangon, Nay Pyi Taw and Mandalay. The project also installed redundant switching systems for the backup route of the backbone network, so that the entire system would continue functioning if a problem occurred with the backbone network.

(2) Enhancement of the metro network in the three cities

The project installed wavelength division multiplexing systems, digital microwave communication systems, switching systems and power supply systems for the metro networks in the three cities, and formulated metro ring networks, so that MPT can provide high-speed internet services and dedicated-line services to office buildings and business establishments in the three cities by connecting them with fiber optic cables.

(3) High-speed radio broadband access in the three cities

In order to meet communication needs at the time of the SEA Games and the ASEAN conference, an LTE communication system was introduced to make high-speed radio broadband access available in the three cities. The element management system was installed in Nay Pyi Taw, a total of 50 sets of LTE compact radio station systems were installed at the sports grounds and international conference halls in the three cities, and the LTE compact radio station systems were connected to the metro network systems. In addition to these systems, 250 WiFi routers for LTE in total were installed in the three cities, so that internet could be connected through WiFi, which is generally available in these cities.

(4) Improvement of internet access

Equipment such as the core router, firewall servers, load balancers, network address translations, DNS[9] cache machines, bandwidth control device and others, were installed in the existing internet access networks. In addition, internet systems were reconstructed, so equipment was connected to each other and linked with existing networks. By this arrangement, the network became capable of dealing with increasing traffic volume effectively; the situation of the internet not being connected when a problem occurred at any one of the locations in the network was now avoidable.

[9] DNS (Domain Name System) is a system to administrate and operate domain names and IP addresses used for their corresponding host names and e-mails on internet.

(5) Reinforcement of the international gateway

At the time of project planning, there was only one international gateway at Yangon. This project set up another international gateway at Nay Pyi Taw. The project also reconstructed the network system so that these two cities were linked to each other. By this arrangement, when a problem occurred in the international cable connected to Yangon, it would be connected through Nay Pyi Taw; as a result, a system was established whereby the internet connection would never be interrupted. In addition, a DDoS detector[10] was installed at the international gateway at Yangon, so that network attacks from overseas can be detected.

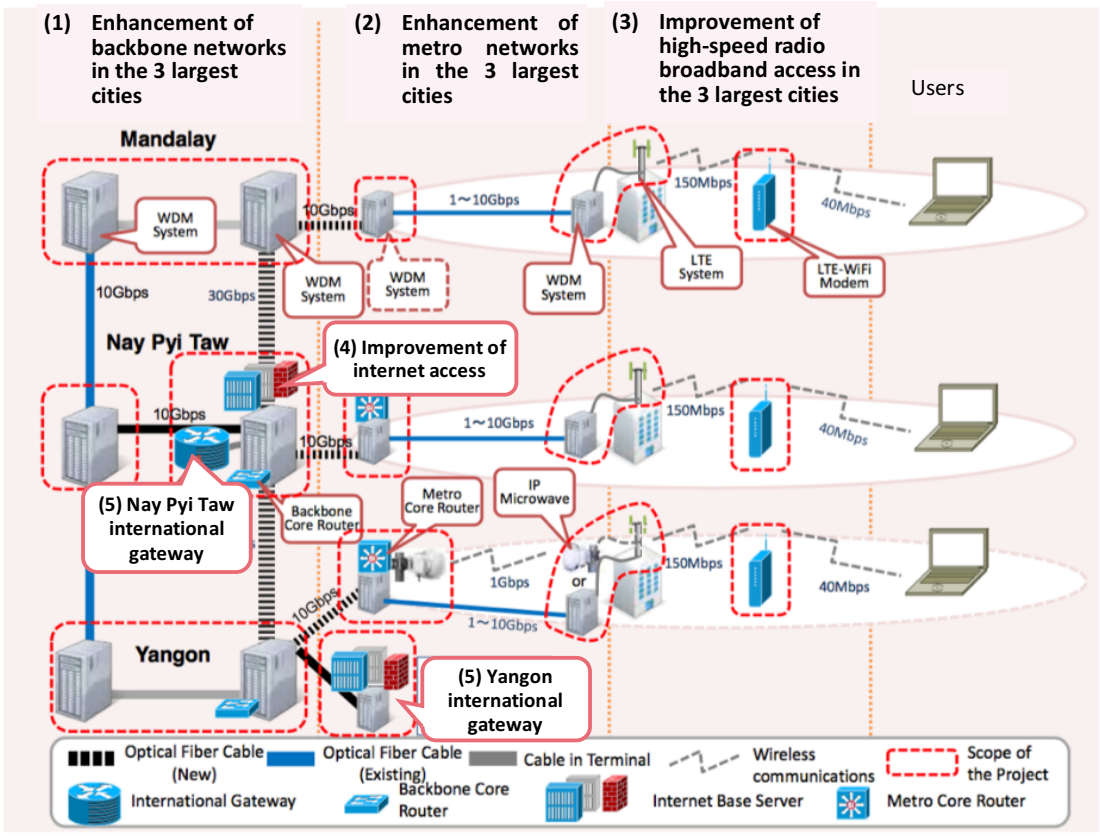


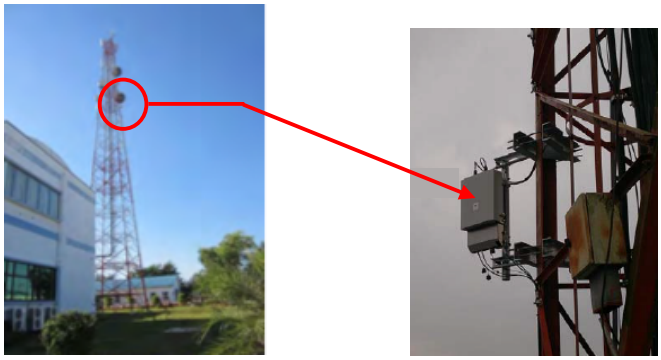
Figure 4 Equipment procured by the project[11]

Redundant switching system for backbone ring network (Nay Pyi Taw)

Redundant switching system for metro ring network (Yangon)

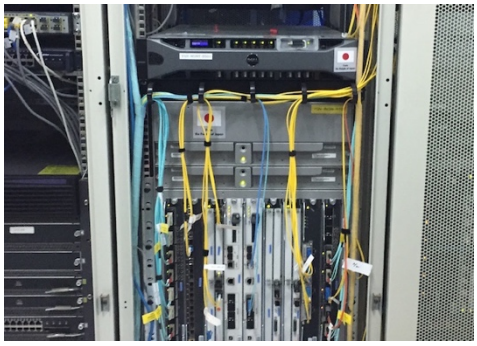
[10] DDoS attack (Distributed Denial of Service attack) is an attack in which multiple computers are used to send requests for connection at the same time, targeting a particular server - this increases load or traffic volume and thereby shuts down the function of the server.

[11] WDM system (Wavelength Division Multiplexing system) is one of the photonic technologies for transmitting a large volume of signals.



Equipment for high-speed radio broadband access in Nay Pyi Taw
(Right: LTE compact radio station system,
Left: a tower where the system is installed)

Equipment for improving internet access in Mandalay



DDoS detector at the international gateway in Yangon

<Soft components>

Lectures, classroom lessons and workshops for strengthening maintenance systems of communication equipment and networks were conducted for the relevant departments of MPT, including departments of fixed telephones, international communication, long distance communication, mobile communication and IT, in the three cities.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The project cost was planned as Japanese yen (JPY) 1,890 million in total, which included JPY 1,710 million from the Japanese side and Myanmar kyat (MMK) 1,957 million, equivalent to around JPY 180 million,[12] from the Myanmar side. Actual cost was JPY 1,771 million, which included JPY 1,709 million and MMK 673 million, equivalent to around JPY 62 million. The actual cost was within the planned cost (94 percent against the plan).

[12] The planned and actual costs from the Myanmar side were converted by applying the exchange rate at the time of project planning (1 kyat = 0.092 yen, the report of the project preparation study in January 2013) because the IMF rate during project implementation was not available.

3.2.2.2 Project Period

The project period was planned as twelve months from March 2013, the commencement of the designing, to February 2014, completion of the installation. It was actually nine months, from March 2013 to November 2013, and was within the planned period (75 percent against the plan). The project was completed earlier than planned as stakeholders in Myanmar and Japan made a collective effort to complete the project in time for the SEA Games, which was scheduled to be held from December 8th, 2013. (See the column on page 15.)

There were some members in the consultancy team and agencies for procurement and installation of the equipment who had worked in the country for a long time, and, therefore, cordial relations were established with MPT; this facilitated efficient implementation of the project. To avoid the risk of project delays due to weather conditions, the project minimized the need for civil construction by utilizing MPT's existing fiber optic cables, buildings of the exchange stations and steel towers for installation of the equipment, as they knew that the time for procurement and installation would be during the rainy season.

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

3.3 Effectiveness[13] (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

＜Operation Indicators＞

At the time of planning, proposed operation indicators of the project were improved communication speeds of the backbone network between the three cities, the metro networks and radio broadband. The external evaluator studied these indicators and found that all of them had improved at the time of the ex-post evaluation.

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

Table 1 Operation Indicators

Items	Baseline	Target	Actual			
	2012	2016	Nov. 2013	Dec. 2014	Dec. 2015	Oct. 2016
	Planned Year	3 Years After Completion of the Project	Completion Year	1 Year After Completion of the Project	2 Years After Completion of the Project	3 Years After Completion the Project
(1) Improvement of the speed of the backbone network	Around **10Gbps**/ without backup	**30Gbps**/ with backup of 10Gbps	**30Gbps**/ with backup of 10Gbps	**100Gbps**/ with backup of 10Gbps	**200Gbps**/ with backup of 200Gbps	**300Gbps**/ with backup of 200Gbps
(2) Improvement of the speed of the metro networks	**1 -10Gbps**	**10Gbps**	**10Gbps.** Redundancy was improved. Expansion of usage.	**10Gbps**. Redundancy was maintained. Further expansion of the usage.	**10Gbps**. Redundancy was maintained. Further expansion of the usage.	**10Gbps**. Redundancy was maintained. Further expansion of the usage.
(3) Improvement of the speed of the radio broadband	Wi-Max : Max. transmission speed of **2Mbps**	LTE: Max. transmission speed of **100Mbps**	LTE: Max. transmission speed of **100Mbps**	LTE: Max. transmission speed of **100Mbps**	LTE: Max. transmission speed of **100Mbps**	LTE: Max. transmission speed of **100Mbps**

Source: The baseline and target figures were from the report of the preparatory study of this project; the actual figures were submitted by MPT.

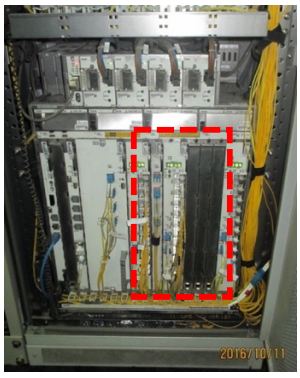
Note: Improvement in indicators of (1) and (2) after completion of the project were realized as a result of MPT purchasing additional equipment and installing them in the equipment procured by the project 2014 onwards.

The speed of the backbone network was approximately 10Gbps and 30Gbps at the time of planning and completion of the project respectively, which was the expected figure. To further enhance the backbone network, MPT increased the speed of the network in stages to 100Gbps, 200Gbps and 300Gbps, by purchasing some additional equipment (transponders[14]) after the completion of the project; MPT installed them into the wavelength division multiplexing systems so that they could meet the increasing needs of communication (see photos).

This project also ensured redundancy of the systems by improving the backup route of the backbone networks. MPT also increased the speed of the backup route up to 200Gbps by purchasing and installing some new equipment after the completion of the project, because the backup route, also, needed to be upgraded in accordance with the enhancement of the backbone networks.

[14] Transponder is a collective term for equipment responding to incoming signals, such as relay transmission of electric signals received and mutual exchange of electric signals and optical signals. It is a composite word from transmitter and responder.

At the time of completion of the project



At the time of ex-post evaluation

The main router for the backbone network at the Mayangone International Transmission Maintenance Center Exchange in Yangon. Two transponders (marked by a red dotted line) had been added by the time of the ex-post evaluation.

The speed of the metro networks was 1 - 10Gbps and 10Gbps at the time of planning and completion of the project respectively. This was the expected figure. In addition to this, as the project constructed the ring network, the network connection would be maintained through a detour at any time even if an accident or problem occurred in the network: therefore, redundancy of the system was ensured. Before the project, MPT used to provide a service called "fiber internet access" to business entities and government institutions, with a speed of 1Mbps - 100Mbps. After the project, MPT had started a high-speed internet service called "B2B plan" in Yangon, using the metro networks developed by the project, with an aim of offering a communication service both faster in speed and larger in capacity. This is a service offering communication capacity of 400MB - 10GB; the main customers are office buildings and business entities. In addition to this, MPT started a dedicated network service by using IP-VPN technology in Yangon and Mandalay using the metro networks from 2016.[15] This is a high security service which links specific places; the main customers are financial institutions and others.[16] MPT had purchased additional equipment for several exchange centers in Yangon, which have higher demand, and installed them to the metro networks when needed; this had expanded the services. In this way, the metro networks have been actively utilized for providing faster and larger communication services to business entities and government institutions in Yangon and Mandalay, the economic centers in the country.

As for radio broadband communication, Wi-Max of 2Mbps was available at the time of project planning; after the introduction of LTE communication, a speed of 100Mbps has become available at the time of completion and ex-post evaluation. This, too, was exactly expected as an effect of the project.

[15] IP-VPN is one of the virtual private networks, which are developed and operated by each network operator in a closed manner. It has superior security and quality control.

[16] The number of subscribers of B2B and dedicated network service are shown in the chapter on "impact" in this report.

＜Effect Indicators＞

At the time of planning, proposed effect indicators of the project were quality, connectivity and stability of transmission of the internet in the three cities. The information shown in Figures 5 - 8 was provided by MPT for the ex-post evaluation to show improvement in these items, such as quality, and its background.

Figure 5 shows total traffic capacity and traffic usage in the three cities. The traffic usage has increased year by year. This is the result of a rapid increase in the number of users of mobile phones and internet communication, which happened after introduction of the policy to open the market for mobile communication services. As a consequence of the fact that two private communication operators came into the market from August 2014, a competitive environment was created, the price of SIM cards and usage fees of these operators became much lower,[17] and advertising campaigns and sales networks expanded. Figure 5 also shows that MPT increased traffic capacity year by year according to the increase of the usage. This was realized because MPT continuously enhanced the facility by re-structuring the configuration or design of equipment procured by the project, and purchased additional or new equipment after enhancement of the facility conducted by the project. The equipment introduced by the project served as a foundation for the continuous enhancement made after completion of the project.
Figures 6 and 7 show improvement of upload and download speed of the networks. Figure 8 shows improvement or maintenance of the Ping result, which shows speed of response of the networks.

Accordingly, the communication services of MPT have been improved or maintained as a result of this project; further enhancement of the facility was conducted in accordance with the increasing traffic volume after the project.

[17] According to interviews with staff at JICA (Japan International Cooperation Agency) Myanmar office conducted at the time of the ex-post evaluation, the official price of a SIM card was around 200,000~1,500,000 kyat (around 20,000~160,000 JPY at the exchange rate then) and from one to four million kyat (110,000~420,000 JPY) in market price prior to August 2014. Furthermore, one could not purchase a SIM card until winning a lottery. The price of a SIM card was reduced to 1500 kyat (around 150 JPY) from August 2014 onward (it was the same price, 1500 kyat, at the time of the ex-post evaluation). Usage fees for telephone and data have also been reduced.

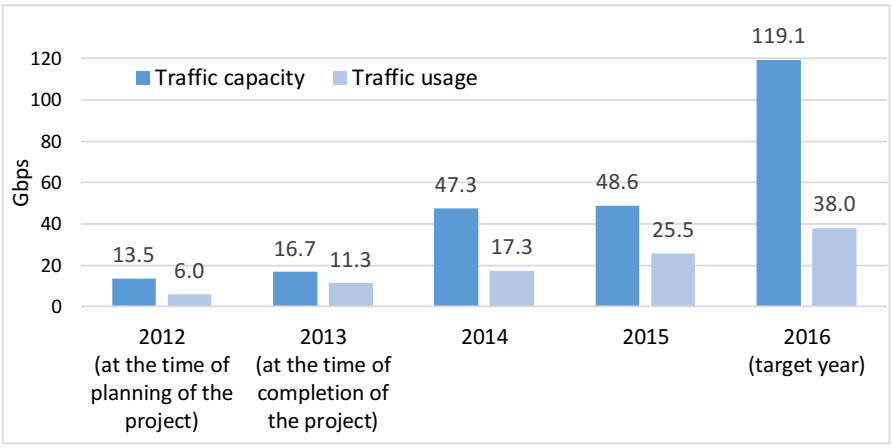
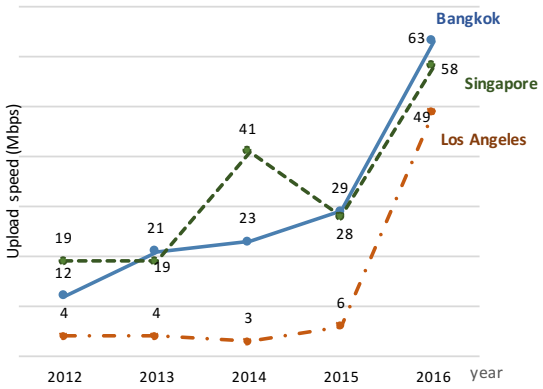


Figure 5 Traffic capacity and traffic usage of MPT (total of the three cities)

Note: Figures are those at the end of December every year. The figure for 2016 was for the end of September.
Traffic capacity is the maximum information-carrying capacity of a network. In the above figure, it is the transmission speed the internet attained when connected to the server of the networks which link the three cities, according to communication theory. Traffic usage was the speed which was actually attained when information was carried by the network.

Source: Illustrated by the external evaluator based on the document submitted by MPT



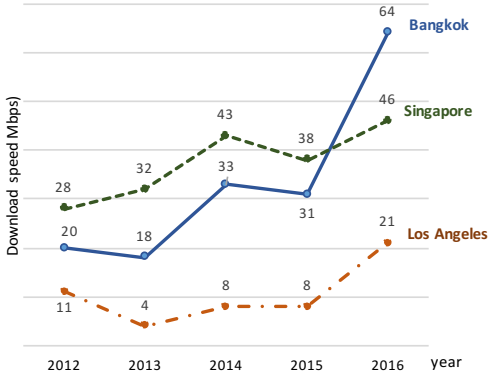


Figure 6 Result of upload speed tests

Figure 7 Result of download speed tests

Note: The download and upload speed is the speed of a computer in a particular location to obtain or send data from other computers in other locations through the internet. The larger the value, the faster the speed. The tests were conducted by using an application for testing speed on the last day of December every year at the MPT Hantharwaddy Exchange in Yangon. The speeds for obtaining and sending data from the computers in Bangkok, Singapore and Los Angeles were tested. (Year 2016 shows the test result on the last day of September 2016.)

Source: Illustrated by the external evaluator based on the document submitted by MPT

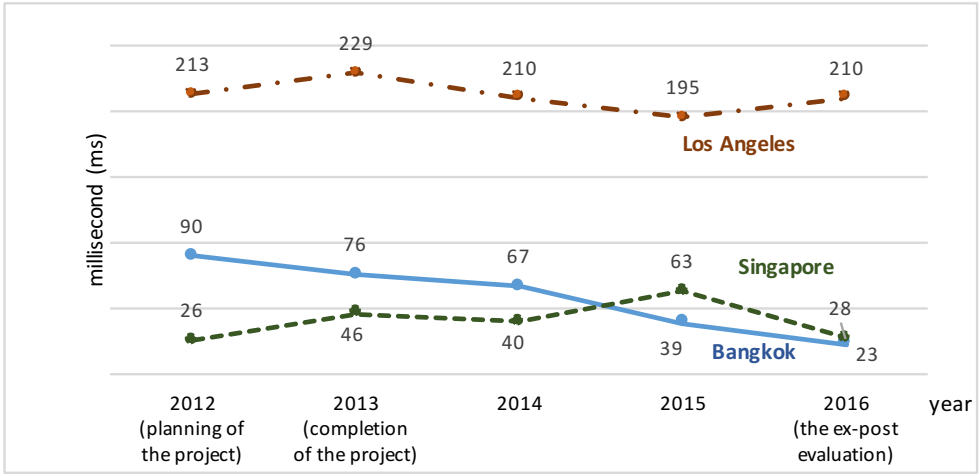


Figure 8 Ping results (measured at the MPT Hantharwaddy Exchange in Yangon)

Note: Ping is the time a computer takes from the time it requests another computer to send data until it is sent accordingly. It shows response speed of the communication network. The unit is millisecond (ms). The smaller the value, the faster the response speed. The values in the Figure are those measured on the last day of December every year. (Figure of 2016 was measured at the end of September.)

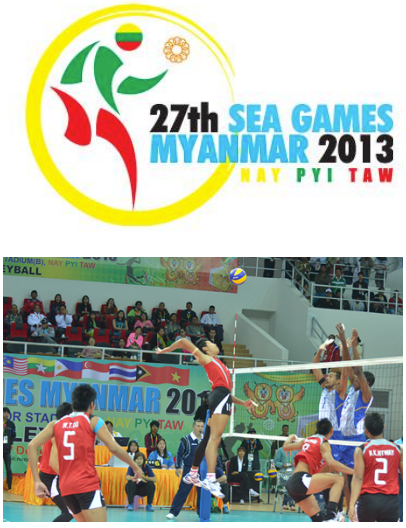
Source: Illustrated by the external evaluator based on the document submitted by MPT

3.3.2 Qualitative Effects (Other Effects)

This project was a timely assistance for the liberalization of the telecommunication market in the country and the SEA Games held in December 2013. The following column explains that this project supported the operation of the SEA Games and contributed to raising the international presence of the country.

<Column: The timely completion of the Project contributed to fulfilling communication needs in the SEA Games >

The SEA Games started in 1959. One South-East Asian country hosts the event in turn every two years. It was after 44 years that Myanmar hosted the event in 2013 - Myanmar had not hosted the event since 1969. The events had become to be at a higher level in terms of facility, opening and closing ceremonies and operation in those days. Therefore, the Myanmar government also aimed to host the event up to the level of expectation of others, with national pride at stake.



Logo and a picture of the SEA Games (Source: Official Facebook)

The city of Nay Pyi Taw, the main venue of the event, became the capital of the country instead of Yangon in 2006. At the time of project planning, there was very little facility of WiFi communication in the city, and the internet speed was slow. Therefore, the project planned to introduce high-speed WiFi communication

through LTE, improve internet connectivity and fulfil the communication needs for the event.

To realize this plan, it was necessary for the project to be completed before the opening of the event. According to stakeholders of the project, the top management and ministers of the relevant ministries and departments of the country visited project sites many times to ensure progress with installation of equipment on holidays and other available days. It is true that top officials in the country pinned their hope on this project. The staff on the Japanese side did their best to complete the project early by carrying out designing, manufacturing and transport of equipment efficiently, and providing necessary advice in advance to the relevant departments of the country so that the project would not be stagnated due to a delay in custom clearance and payment of taxes. The efforts made by the two countries yielded results. Installation of all the equipment was completed in November 2013. The project team conducted test operations and technical transfer during a few weeks before the opening of the event. Everybody was fully ready for the event.

The SEA Games received approximately 4,700 athletes from 11 countries. The 28 different sporting events were carried out smoothly. The operation of the event was carried out extremely well. The equipment installed by the project functioned without any problem, and met the communication needs of the event. The LTE facility was widely utilized as a communication tool among the different groups of people who were undertaking operation of the event, for data transmission of the result of various sport events to be displayed on sign boards at the sports grounds, for media personal from different countries to send results of events to the broadcasting stations of their respective countries, and other purposes. The athletes from different countries and visitors were able to use the high-speed WiFi service free of charge on their smartphones. According to senior officials of MPT, the communication services introduced by the project were very much appreciated by the stakeholders of the event; there were no problems or complaints.

Myanmar won 233 medals, including 86 golds at the event. This was the second highest after Thailand, and the event brought great pleasure to the people in the country. The SEA Games was a symbolic event for the country in its effort for democratization. The success of the event contributed to raising the international presence of the country. Furthermore, the communication equipment introduced by the project functioned without a problem at the ASEAN summit conference held in May and November of 2014 at Nay Pyi Taw, and fulfilled the communication needs at the conference.

3.4 Impact

3.4.1 Intended Impacts

This project stimulated the infrastructure development of MPT, and helped them to deal with a rapid increase in communication demand after completion of the project. Therefore, this ex-post evaluation studies expansion of usage of the communication services of MPT, because

this was considered an impact of both this project and further enhancement of the infrastructure after the project.[18]

Table 2 shows the trend in number of subscribers to communication services of MPT. It shows a drastic increase in the number of subscribers for mobile internet and ADSL services year by year, and introduction of new services, such as B2B internet and dedicated network. It clearly shows that MPT was expanding the number of subscribers and the kinds of services.

Table 2 Number of subscribers to the internet and network communication services of MPT in recent years

Items	2012	2013	2014	2015	2016
Mobile internet	743,824	2,105,628	4,060,631	14,129,218	19,405,080
ADSL	5,241	7,905	11,899	15,632	18,370
B2B internet	-	-	-	202	651
Dedicated network service	-	-	-	-	11,527

Note: Figures are those at the end of December every year. (Figure for 2016 was measured at the end of October.)
Source: Document submitted by MPT

The beneficiary survey conducted in the ex-post evaluation (see footnote 8) studied the opinion of people in the three cities about improvement of communication services in recent years (about last three years). All the respondents were appreciative of the improvement in communication services and communication environment, and mentioned improvement in services for mobile phones and internet, for example. The lower price of SIM cards, and improved availability of SIM cards, convenience in payment of user fees, telephone connectivity, voice quality, customer care services, speed of internet, were also mentioned, as shown in Figure 9.

[18] Contributing to the economic development of the three cities benefitted by the project was expected as an impact of the project at the time of planning. It was difficult to identify the impact of this project on the economy as economic development was largely influenced by other matters, such as trend of investment and business operations, in addition to improvement in the environment of communication; the economy of the country was continuously developing, and GDP growth rates in recent years were 7.2% - 8.7%.

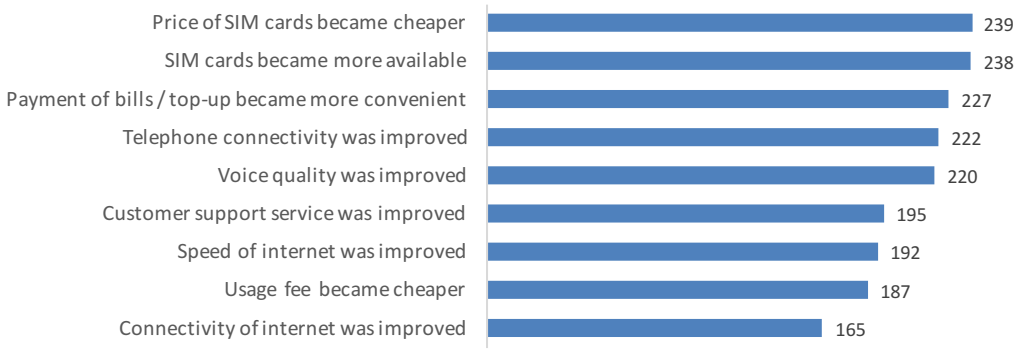


Figure 9 What kind of improvement do you think was there in recent years relating to mobile phones and internet services

（n=258, multiple answers allowed）

Source: Beneficiary survey

Ninety percent of respondents answered that "There was a positive impact due to the improvement of communication services". Improvement in communication with people living far away and in workplaces, and increased business chances and opportunities for better jobs, were the most frequent answers for examples of positive impacts (Figure 10).

Figure 10 In what ways has the change in the communication environment been positive?

（n=244, multiple answers allowed）

Source: Beneficiary survey

In summary, it was found that the users were highly enjoying improvements in communication services that happened in recent years, and these had brought various positive impacts to their daily life and working environment.

3.4.2 Other Positive and Negative Impacts

There was no impact on the natural environment, land acquisition or resettlement by the project.

This project has achieved its objectives. Therefore, effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

MPT is responsible for operation and maintenance of the facility and equipment introduced by the project, which has not changed from the time of planning the project. Organizational structure and place of responsibilities in MPT at the time of the ex-post evaluation are clear. MPT has the necessary staff in each division, and there are no vacancies in important posts. The Operation Unit under the Technical Division is in charge of the operation and maintenance of the equipment and facility.

MPT has been in a competitive environment since private companies participated in the market in 2014. MPT has been making a keen effort to enhance competitive strength and improve services, by absorbing marketing and service know-how from the joint operation partner of KSGM, having renewed its brand logo, established wholly-owned outlets, implemented public relations activities actively and enhanced network facility in stages in recent years. MPT has been conducting operation and maintenance of the equipment efficiently, utilizing external professional agents as needed.

As mentioned above, institutional arrangements of MPT for the operation and maintenance are well established, and will facilitate sustainability of the project effect.

3.5.2 Technical Aspects of Operation and Maintenance

There have been no technical problems with regard to the operation and maintenance of the equipment procured by the project to date. Daily maintenance of the facility and equipment is conducted mainly by the staff of MPT. MPT conducts maintenance work efficiently, outsourcing repair and other work when necessary. As mentioned earlier, traffic volume and demand has increased rapidly after completion of the project as a result of the policy of liberalization of the market and others, followed by the participation of private telecommunication operators. MPT obtained timely advice from the Japanese engineers of KSGM, which is the joint operation partner of MPT, and managed the rapid increase in traffic volume by effectively utilizing the equipment procured by the project.

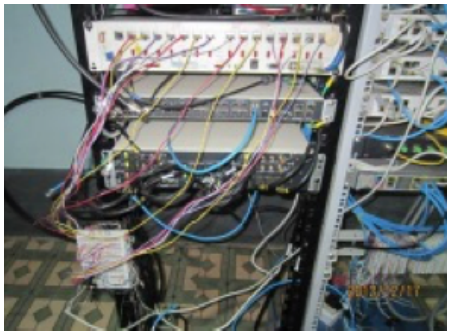
There have been no large-scale repairs or problems for the equipment of the project so far. MPT plans to manage these by obtaining advice from KSGM or local agencies of the manufacturer of the equipment, should any such problem occurs in future.

MPT analyzes training needs and sets targets for each staff member, and compiles these into a training master plan every year. MPT is carrying out capacity development of staff according to

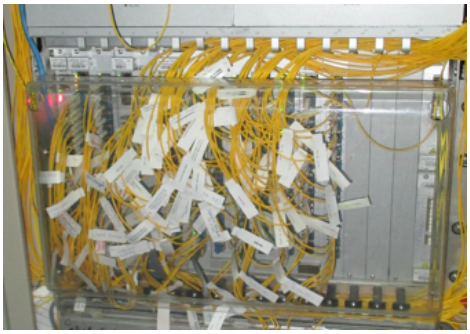
the training master plan. MPT is actively implementing capacity development of soft skills, such as English language, in addition to technical skills.

There is an example of an improvement that was realized following advice provided to MPT technical staff by the Japanese technical staff during the time of project implementation; this was still taking place at the time of the ex-post evaluation (see photos below).

As explained above, there is no problem of sustainability in terms of technical aspects.



At project planning: It was difficult to find the destination of cables as there were no labels and the cables drooped. (The photo was taken from a document provided by JICA)



At the ex-post evaluation: Destinations of the cables can be identified easily as there are labels and the cables are bundled as needed. (The photo was taken by the external evaluator)

3.5.3 Financial Aspects of Operation and Maintenance

As mentioned in "2.3 Constraints during the Evaluation Study" of this report, MPT does not make its financial information available to the public at this moment; therefore, the external evaluator could not obtain financial information, such as a profit and loss statement. Hence, a quantitative analysis of the financial status of MPT could not be carried out.

According to the Managing Director and General Manager (Technical) of MPT, the financial status of MPT is positive. Business income has been increasing at a satisfactory pace, and they have good prospects in future regarding their financial status. As mentioned in the chapter on "effectiveness" in this report, MPT has been making new investments in their communication infrastructure in positive manner, to meet the increasing demand. It was mentioned that necessary and adequate budget has been allocated for the operation and maintenance of the facility and equipment they own, including that procured by the project, as they place the highest priority on network stability.

There have been no problems in terms of finance in the operation and maintenance of the facility and equipment provided by the project. Their financial status seems to be positive as no problem was found.

3.5.4 Current Status of Operation and Maintenance

It was found that almost all the equipment procured by the project, except a few, has been effectively utilized continuously, and that we can expect continuous utilization in future. It was

also found that the status of operation and maintenance was satisfactory.

The capacity or function of some equipment was expanded after the project. The capacity of the equipment for backbone networks between the three cities was enhanced as a result of MPT purchasing supplementary equipment and installing it into the original equipment. MPT installed additional equipment to the equipment for the network within the city of Yangon, and, therefore, MPT's services were expanded. MPT expanded the capacity of the equipment to improve internet access, and was using this continuously - this expansion was possible because the technical specification of the equipment allowed for adjustments in corresponding to increase in traffic volume. Additional equipment was connected to the equipment for the international gateway in Yangon to meet increasing communication needs.

Some equipment for the backup route for the backbone network between the three cities is currently not utilized, as its capacity became insufficient as per the enhancement of capacity of the backbone network. MPT plans to utilize it by relocating it to appropriate locations by coordinating with the on-going ODA Loan project and ensuring integrity of the equipment.

The equipment for LTE communication is still utilized currently as a communication tool when there are international conferences or sports events. It is also used in some offices of MPT, offices for ministries and the airport in Nay Pyi Taw. However, around half of the 50 sets are not utilized. They are mainly those installed in and around the smaller sports grounds. They are not utilized because international public events, which require large-scale data communication services, have not been held in these places after the SEA Games. The frequency band used by this equipment was allocated to MPT by the Department of Post and Telecommunications, which is under the purview of the Ministry of Transport and Communication, with a condition that it will be used for international public events. Therefore, it is currently difficult for MPT to use this equipment for other purposes. MPT was of the opinion that the Ministry of Transport and Communication and Department of Posts and Communication would have to be involved when considering re-utilization of this equipment.

As explained, there was no problem with the operation and maintenance of the equipment introduced by the project in terms of institutional, technical and financial aspects; most of the equipment is utilized effectively. There is a prospect that the equipment will be effectively utilized in future, too. However, currently, the LTE equipment is utilized to a limited extent. Therefore, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented to enhance capacity of communication services, by improving communication networks in and between the three largest cities in Myanmar, and thereby contribute to economic development and improvement of the living condition of people in the country. The project has been highly relevant to the development plan of Myanmar, which aims to drastically increase the population coverage of communication services; to the development needs of the country, including developing communication infrastructure in line with the

increase in the number of users and traffic volume of communication services, and fulfilling communication needs of upcoming international events, such as the SEA Games at the time; and to Japan's ODA policy, which places importance on the development of infrastructure and institutions necessary for sustainable economic development. Therefore, its relevance is high. Procurement of equipment and capacity building program (soft components) was conducted as planned, and both the project cost and project period were within the plan. Therefore, the efficiency of the project is high.

Improved communication speed of the backbone networks and metro networks of the largest three cities of the country, and improved internet access were realized as planned due to the implementation of this project. After completion of the project, MPT enhanced its facility continuously due to the increase in traffic volume and demand by increasing the capacity of the equipment introduced by the project and purchasing additional equipment. The communication service of MPT has been improved and the equipment has been maintained properly. This project supported the operation of the SEA Games and contributed to raising the international presence of the country. The beneficiary survey conducted in the ex-post evaluation found that the users of communication services in the country had benefitted in various ways as a result of this project and improvement of communication infrastructure and services realized after the project, such as improvement in communication with people living far away and in workplaces, increased business chances and opportunities for employment and better jobs. Therefore, the effectiveness and impact of the project are high.

There were no problems with the operation and maintenance of the equipment introduced by the project in terms of institutional, technical and financial aspects; most of the equipment is utilized effectively. There is also a prospect of the equipment being effectively utilized in the future. However, currently the equipment for LTE communication is utilized to a limited extent. Therefore, sustainability of the project effects is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Around half of the equipment for LTE communication was not utilized at the time of the ex-post evaluation due to restrictions on the unique frequency band and purpose of usage for the equipment allocated and instructed from the Department of Posts and Telecommunications. It is advisable that MPT cooperate with the Ministry of Transport and Communications in formulating a policy and plan, and in implementing a measure for effective usage of this equipment.

4.2.2 Recommendations to JICA

It is recommended that JICA cooperate and provide advice to the relevant institutions, particularly the Ministry of Transport and Telecommunications, and monitor progress of the above-mentioned process for the effective utilization of the equipment for LTE

communications.

4.3 Lessons Learned

Procurement of equipment with a technical specification that is compatible for increased volume of traffic, and providing necessary advice after completion of the project, are effective for the equipment to be actively utilized continuously.

Usage of mobile phones rapidly became popular in Myanmar after market liberalization, and traffic volume increased drastically after the completion of the project. MPT implemented measures to respond to this trend, such as increasing the capacity of equipment procured by the project, purchasing additional equipment to be installed into the equipment and others, by obtaining advice from the Japanese engineers of their joint operation partner and staff of the manufacturers of the equipment. As a result, there has been a drastic increase in the number of users of the services of MPT, an improvement in the services and the continuous and active utilization of the equipment introduced by the project.

In a project for enhancement of communication infrastructure in a country where rapid increase in communication demand is expected, it is important to make the predicted increase in traffic volume after completion of the project as accurate as possible, to make technical specifications of the equipment able to respond to the increase, and to ensure an arrangement to provide advice on effective utilization of the equipment when needed, for continuous and effective utilization of equipment to be procured by the project.

Lao People's Democratic Republic

FY2016 Ex-Post Evaluation of Technical Cooperation Project

"Project on Human Resource Development in IT Service Industry at NUOL"

External Evaluator: Kazuko Shirai, Kaihatsu Management Consulting, Inc.

0. Summary

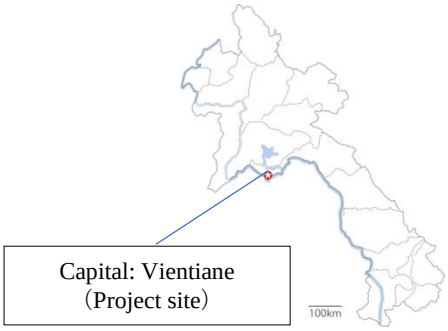
This project was implemented at the National University of Laos (NUOL), with the aim of fostering human resources to meet the needs of the information technology (IT) service market. At the time of planning and completion of the project, promoting the IT industry and fostering human resources for this were important policy targets for the country. The need for advanced IT human resources in the industrial sector of the country has been also high, and consistent with the country's development policy and needs. At the time of planning, the advanced level of human resource development for strengthening private sector was a key area in Japanese assistance policy to support Laos Government. Therefore, the relevance of implementation of this project is high.

Most graduates of the IT Specialist Course (ITSC) at the Department of Computer Engineering and Information Technology (IT Department), Faculty of Engineering, NUOL have been employed by IT companies in the country, and have a good reputation in their places of work. Short courses have been conducted by IT Business Unit (ITBU) every year. These courses are implemented as seminars for IT industry human resources outside the university, utilizing a part of the IT related subjects (lecture modules) which consists of ITSC. This realizes the project objective of developing and enhancing IT human resources. Since this project also contributed to the development of the IT industry in Laos to some extent, which was its overall goal, effectiveness and impact are high. In addition, project cost and period were as planned. Therefore, efficiency of the project is also high.

The national policy and NUOL system to maintain the IT Practical Master Course (ITPM), which was established based on the ITSC, are expected to continue in the future. The operation system of the IT Department in the Faculty of Engineering at NUOL is appropriate, apart from the inadequate operation system of Lao IT Business Incubation Center (LIBIC). The techniques of lectures in ITPM have been maintained without any problem. There is a minor problem with financial operation, as no budget has been allocated to update equipment required for practical work in the ITPM network course. Therefore, the sustainability of effectiveness through implementation of this project is fair.

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

1. Project Description



Project Location

source: website of Ministry of Foreign Affairs of Japan

Building of IT Department, Faculty of Engineering where ITPM is implemented

1.1 Background

At the time of planning this project, while neighboring countries had taken measures to promote their economy through utilization of IT, the utilization and development of IT in Laos had been delayed, and there was concern that disparity between Laos and other countries had been widening in stimulating their economy through utilization of IT. Therefore, JICA Technical Cooperation Project, 'The Upgrading Information Technology Education Project (Information Technology Bridging Course) (2003-2008)' was implemented at NUOL, with the aim of higher diploma holders obtaining a Bachelor's degree in a short time frame.

The IT Bridging Course, supported by the project to start as a Bachelor's degree program at the Faculty of Engineering at NUOL, mainly aimed to train students as system administrators for operation and maintenance of IT systems. This course produced four batches of graduates by the completion of the project.

This project achieved its objective to a certain extent; however, there was a strong need to educate IT specialists who were highly skilled and ready to contribute to IT service industry development in the future. Therefore, educating IT specialists in the field of networks, databases, application development, project management. The project was implemented to fulfill this need.

1.2 Project Outline[1]

Overall Goal		IT service industry is well-developed in the Lao PDR.
Project Purpose		Human resources are developed according to the IT service market through the ITSC by the IT Department of the Faculty of Engineering at the NUOL.
Output(s)	Output 1	ITSC are properly operated at the IT Department of the Faculty of Engineering, the NUOL.
	Output 2	The IT Business Unit (ITBU) is properly operated at the IT

[1] The Project Design Matrix (PDM) used in the ex-post evaluation was the revised final version dated June 2011.

		Department of the Faculty of Engineering, the NUOL.
	Output 3	Practical skills and teaching capabilities of lecturers in charge of the ITSC and master course that is planned to be established are enhanced in the field of the software engineering.
	Output 4	ITSC and master course[2], which is planned to be established, are[3] for[4] the practical software engineering and business skills are developed.
	Output 5	Collaboration among the government, industry and academia is reinforced.
Total cost (Japanese side)		345 million yen
Period of Cooperation		December 2008 to November 2013
Implementing Agency		National University of Laos (NUOL)
Other Relevant Agencies / Organizations		None
Supporting Agency/ Organization in Japan		None
Related Projects		● JICA, "The Upgrading Information Technology Education Project (Information Technology Bridging Course)"(Technical cooperation project), April 2003 – March 2008 ● JICA, "ASEAN University Network/Southeast Asia Engineering Education Development Network (AUN/SEED Net) Project Phase3" (Technical cooperation project), 2013 - 2018[5] ● JICA, "The Project on Capacity Building for Supporting Private Sector Development and Japanese Investment in Lao P.D.R. through LJI of NUOL" (Technical cooperation project), September 2014 –March 2019[6] ● Asia Development Bank, "Second Strengthening Higher Education Project" (approved in September 2016)

[2] It is described as 'IT Practical Master Course (ITPM) in Japanese version of this report. However, the evaluator put 'master course' which is used in PDM in English.
[3] 'are' is not grammatically necessary, however, the evaluator put 'master course' which is used in PDM in English.
[4] 'mastering' is described in Japanese version of this report. However, the evaluator did not put it as PDM in English.
[5] AUN/SEED Net Phase 3 aims to support the development of a system for higher education and research through cooperation between the 14 supporting universities in Japan and a network of 26 member universities in 10 ASEAN countries, in order to strengthen cooperation among the member universities, industry, and the local community. NUOL is the only university in Laos to participate. (source: website of JICA, https://www.jica.go.jp/english/publications/j-world/c8h0vm000082pnre-att/1309_03.pdf, accessed on 25 February 2017).
[6] To strengthen the capacity of the Lao-Japanese Center as a major objective, the Project supports implementation of a business course and strengthens the utilization of business networking and operation system for local business entrepreneurs and private companies (including Japanese companies) in Vientiane Capital and Savannakhet Province (source: website of JICA, https://www.jica.go.jp/english/our_work/types_of_assistance/tech/projects/j_center/laos.html accessed on 25 February 2017).

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of Project Purpose at the Terminal Evaluation

An evaluation of ITSC graduates from their major places of employment was positive. Since 95% of the total 62 persons in the first and second batches of graduates found a job with the IT service market, and the number of trainees from the short-term course had increased steadily, it was concluded that the project purpose was mostly achieved.

1.3.2 Achievement Status of Overall Goal at the Terminal Evaluation (Including other impacts)

Considering the number of graduates from ITPM three years after project completion, it was found at the time of the Terminal Evaluation that the possibility of this project changing the proportion of IT services in the GDP of Laos, and the percentage of IT service employees in the working population, was low and difficult to achieve the Overall Goal indicators.

1.3.3 Recommendations from the Terminal Evaluation

Recommendations at the time of the Terminal Evaluation and status of implementation at the time of the Ex-Post Evaluation are summarized as follows:

Table1 Recommendations Provided at the Time of Terminal Evaluation and Status of Implementation at the Time of the Ex-Post Evaluation

Recommendations	Status of Implementation at the Time of the Ex-Post Evaluation
(1) Conduct systematic evaluation of overall program, including the curriculum, teaching materials, equipment and lecturers of ITPM and short-term courses for maintaining the quality of the IT courses	Based on the regulations of the National University of Laos, the curriculum of Master's programs should be revised every five years. As a part of curriculum evaluation activities in the IT Department, the survey on the industrial sector's needs and opinions from graduates was conducted in 2016. The IT Department collected information for updating the ITPM curriculum - this is planned in 2017. Evaluation and revision of teaching materials are conducted based on lecturers' observations of their students' reactions. The lecturers assure that the quality of the course is secured. The meaning of 'systematic evaluation of overall program' is unclear; however, a questionnaire to the students who joined the course during the implementation the project is not required to conduct in the regulations of Master's programs. Therefore, it has not been implemented after

Recommendations	Status of Implementation at the Time of the Ex-Post Evaluation
	completion of the project.
(2) Update IT knowledge of lecturers to reflect the latest needs of the IT industry	After completion of the project, the lecturers have continued to update their IT knowledge by themselves, and some of them could pass the IT technology related commercially certified examination.
(3) Monitor change in enrollment rate of ITPM and make the prerequires less strict if needed	The number of enrolled ITPM students has been monitored by the IT Department. However, the requirements for applications have not been relaxed to ensure the quality of students.
(4) Monitor management capacity of ITBU continuously.	IT Department confirms the implementation status of the short-term course from ITBU, and continuously monitors through a verbal report of the result of questionnaire responded by the trainees.

2. Outline of the Evaluation Study

2.1 External Evaluator

Kazuko Shirai, Kaihatsu Management Consulting, Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: July, 2016 – July, 2017

Duration of the Field Study: October 30, 2016 – November 15, 2016 and
January 22, 2017 – January 25, 2017

2.3 Constraints during the Evaluation Study

Some data for indicators to evaluate the Overall Goal and part of the indicators for Output, which were set in the PDM of the Project, could not be obtained at the time of project completion and ex-post evaluation. Some data required from the time of establishing ITSC and ITPM was also not available; this meant the ex-post evaluator could not measure the status of improvement at the time of project completion and ex-post evaluation. Therefore, for those indicators that lack quantitative information, the ex-post valuator conducted the evaluation using quantitative and qualitative data from interviews and a beneficiary survey as supplementary information.

3. Results of the Evaluation (Overall Rating: A[7])

3.1 Relevance (Rating:③[8])

3.1.1 Consistency with the Development Plan of Laos

In the 6th National Social-Economic Development Plan-NSEDP (2006-2010), which was the Mid- and Long-Term National Development Plan of Laos at the time of planning of this project, the IT sector was a high priority, and one of the important strategies for investment and development. At the time of completion of the project, the promotion of the IT service industry and IT sector was also placed as a key policy in the 7th National Social Economic Development Plan (2011-2015). The ICT[9] National Policy (2009), which was the policy for the ICT sector at the time of project planning and completion, envisaged that the ICT service industry and human resource development were key guidelines.

Therefore, the objective of the Project is consistent with Laos national development plan at the time of project planning and project completion.

3.1.2 Consistency with the Development Needs of Laos

At the time of planning the Project, there was high demand from Laos IT industry for training IT human resources to obtain advanced skills in database, network and application development. However, most people working in the IT industry had studied abroad, and the existing education system could not meet the demand.[10] Even at the time of project completion, there were few Laotian IT engineers. There was a need to secure IT human resources with advanced skills to enhance market competitiveness in the IT industry.[11] The Project was in line with Laos development needs at the time of project planning and completion.

3.1.3 Consistency with Japan's ODA Policy

The 'Country Assistance Program to Laos' (September 2006) of the Japanese Ministry of Foreign Affairs at the time of planning emphasized human resource development at a higher level to strengthen the private sector as a key area. Therefore, the objective of this project, to develop IT human resources at a higher level for the IT industry, was in line with Japanese assistance policy.

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

[8] ③ : High, ② : Fair, ① : Low

[9] ICT stands for 'Information and Communication Technology', and is almost same meaning as IT (Information Technology). There are some cases that IT is defined as computer related technology, whereas ICT focuses more on utilization of computer technology. ICT, replaced by IT, has been widely used in Japan as well since ICT has become internationally familiarized (source: ASCII Digital Glossary http://yougo.ascii.jp/caltar/ICT accessed on 28 March, 2017)

[10] Documents provided by of JICA

[11] Documents provided by of JICA

3.1.4 Appropriateness of Project Planning and Approach

The revision of the PDM during implementation of this project was appropriate. The Project applied a variety of approaches, including: 1) prioritizing capacity-building of lecturers at the IT Department, since there was a need for significant improvement in the capacity of lecturers specially on programing - the course started after strengthening the lecturers' capacity; 2) developing curricula after taking into account opinions from government and private sector; and 3) setting up fieldwork for practical training. These approaches were suitable to promote the education of IT human resources with advanced and practical skills, and to meet the needs of the government and private sector, which were the project objectives (Column 2 as reference).

In light of the above, the implementation of the Project was sufficiently consistent with Laos development policy, development needs and Japan's ODA policy, and the project approach was also in line with the needs. Therefore, the relevance of the project is high.

3.2 Effectiveness and Impact (Rating:③)

3.2.1 Effectiveness

The Project aimed to develop human resources to meet the needs of the IT industry by ITSC, which later became ITPM, in the IT Department, Faculty of Engineering, NUOL. In the ITSC/ITPM, under the instructions of lecturers, several students formed a team for fieldwork, which was implemented with companies to provide students with an opportunity to obtain practical knowledge and skills. In addition, by setting up ITBU under the umbrella of the IT Department, the IT Department has provided part of the ITSC/ITPM course modules as a short-term course to IT industrial human resources outside the university. LIBIC also supported resident companies in start-up, including business planning. There was a public-private partnership with IT service companies and government organizations, through participation in the Curriculum Board Committee, dispatch of lecturers, etc. specially in the time of ITSC. The relationship of organizations is shown in Figure 1.

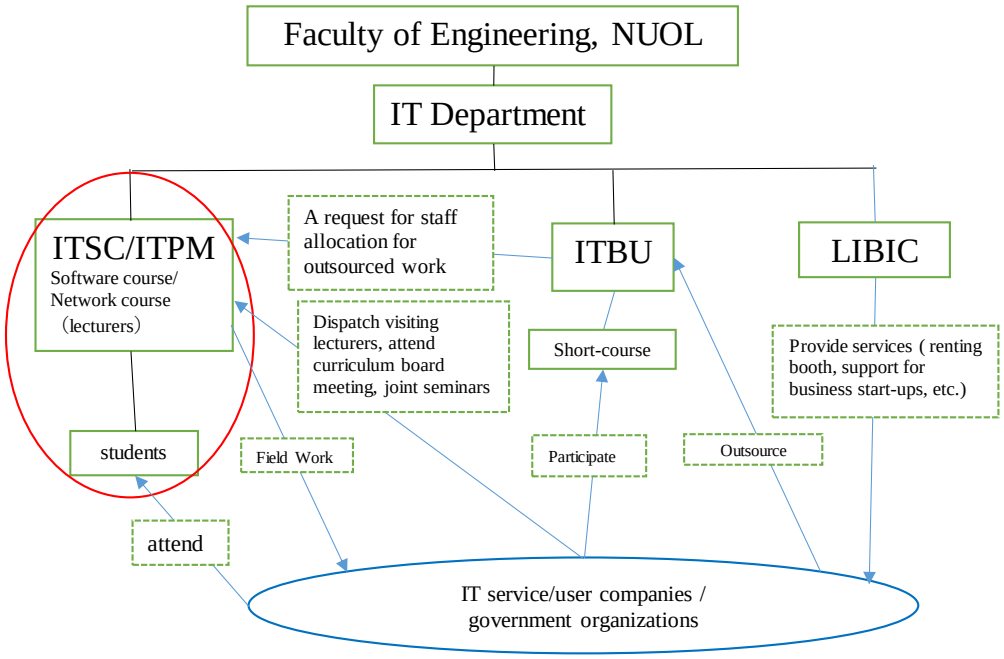

Figure 1 Relationship between ITSC/ITPM and IT industry/related government organizations

Source: Formulated by External Evaluator

3.2.1.1 Project Output

＜Output 1＞

Output 1 was "ITSC are operated properly at the IT Department of the Faculty of Engineering, the NUOL". Two indicators of Output 1 have been achieved, as shown in Table 2.

Table 2　Achievement of Output 1

Indicator for Output 1	Status of Achievement of the Indicators at the time of Project Completion
Indicator1：Guidelines of short term courses, evaluation on lecturers, guidelines on outsourcing [12], library use and others	The planned seven guidelines [14] were all formulated and approved by the Head of IT Department[15].

[12] It is described as 'entrusted development' in Japanese version of this report. However, the evaluator put 'guidelines on outsourcing' as described in English version of PDM. These are guidelines for ITSC to receive outsourcing work to develop software, and were created as operational guidelines for general course and consignment course described below.

[14] There were 2 guidelines for ITSC: (1) 'job description document and office regulation for the unit of ITSC', and (2) 'guidelines for payment and lecturer evaluation for the unit of ITSC'. There were 4 guidelines in ITBU short-term courses: (1) 'accounting guidelines for ITBU service', (2) 'operation guidelines for general course and consignment course', (3) 'regulation for facility rental for ITBU', (4) 'training course guidelines for ITBU'. In addition, 'guidelines for using library' were created.

[15] According to the former Japanese Expert and the Head of IT Department.

Indicator for Output 1	Status of Achievement of the Indicators at the time of Project Completion
necessary for effective implementation of[13] ITSC and ITBU are developed, and approved by the head of IT department. ＜Achieved＞	
Indicator 2 : The recruitment, selection, evaluation of learning results, and graduation approval of students are appropriately conducted. ＜Achieved＞	Recruitment and selection of students, evaluation of learning results, and graduation approval in ITSC/ITPM had been conducted in accordance with NUOL internal standards.[16]

＜Output 2＞

Output 2 was "The IT Business Unit (ITBU) is properly operated at the IT Department of the Faculty of Engineering, the NUOL". As seen in Table 3, Indicator 1 (proper project operation) and Indicator 3 (number of occupiers of incubator booth) had been achieved, whereas Indicator 2 (system development with receiving fee) was not achieved.

Table 3　Achievement of Output 2

Indicator for Output 2	Status of Achievement of the Indicators at the time of Project Completion
Indicator 1 : The operation projects are[17] appropriately managed according to the plan of the ITBU, whose results are reported to and approved by the Head of IT department. ＜Almost achieved＞	ITBU had been properly operated in line with the project plan and the status of operational management had been reported and approved by the Head of IT Department. The operational management had improved, particularly after ITBU manager was changed in 2012. Although the results of questionnaire survey targeted the trainees of short-term courses run by ITBU were

[13] It is described as 'operational guidelines of ITSC and ITBU' in Japanese version of this report. However, the evaluator put 'and others necessary for effective implementation of ITSC and ITBU' as described in PDM in English.
[16] According to an interview with the former Japanese expert, the Project aimed to establish the ITSC. The project produced two batches of ITSC graduates by project completion. The ITPM course was developed based on the ITSC curriculum to be a Master's program, and it was opened during implementation of this project (January 2013). ITSC was dissolved after establishment of the ITPM. The first batch of graduates from ITPM was produced after completion of the project (September 2014). (Study period in ITPM is two years. However, the number of years of study for the first batch only was reduced due to a delay in the starting period.)
[17] The operation project is described as singular in main text in this report, however, the evaluator indicated it as plural projects, as described in PDM in English.

Indicator for Output 2	Status of Achievement of the Indicators at the time of Project Completion
	not quantitatively summarized nor analyzed, the suggestions on teaching methods of lecturers had been useful for course improvement.[18]
Indicator 2 : The ITBU comes to be able to receive works on the system development from the government and industry for profits. ＜Not achieved＞	At the time of project completion, there was no record of receiving orders of a fee-based system development. The key operation of ITBU was implementation of the short-term course. Fee-based system development was considered as a secondary objective. When undertaking a fee-based work for system development, lecturers have to take a huge responsibility until completion of the work. In addition, they were very busy in implementing numerous short-term courses, which provided them with secondary income. Therefore, it was not necessary for them to take fee-based business which is why this indicator was not achieved.
Indicator 3 : More than three [19] incubation booths at ITBU [20] are occupied during the Project period.[21] ＜Achieved＞	At the time of project completion, three booths were occupied by a restaurant search site operating company, web portal service company, and electronic free paper publication company.[22]

Fee-based system development was not regarded as a priority for ITBU, and no orders were confirmed. However, the short-term course, which was the major task of ITBU, was largely properly operated, the evaluation of ITBU's short-term course by trainees had been used for course improvement, and the incubation booths were utilized. Therefore, Output 2 was achieved to some extent.

[18] Interview with the former Japanese expert
[19] 'More than three' means at least four in English, while the project meant to achieve at least three (and more). The evaluator put 'more than three' as described in PDM in English.
[20] 'at ITBU' is not described in the Japanese version of this report. However, the evaluator used it as described in PDM in English.
[21] Ditto.
[22] Interview with the ITBU manager.

＜Output 3＞

Output 3 was "Practical skills and teaching capabilities of lecturers in charge of the ITSC and master course that is planned to be established are enhanced in the field of the software engineering". The achievement status of each indicator is shown in Table 4.

Table 4　Achievement of Output 3

Indicator of Output3	Status of Achievement of the Indicators at the time of Project Completion
Indicator 1: Satisfaction ratings (evaluation) of the lecturers are enhanced by students and trainees[23] ＜Almost achieved＞	At the time of project completion, the survey of satisfaction on lecturer performance (including lecturer evaluation) had been conducted by ITBU and the project. Survey results had been orally passed from the Japanese expert to the Head of Department, who had provided the lecturers with necessary instruction.[24] In the beneficiary survey[25] at the time of the ex-post evaluation, an average of respective responses[26] showed that more than 90% of students (graduates of ITSC1, ITSC2) were 'very satisfied' or 'satisfied' with the lecturers' performance. Based on this result, satisfactory rate at the completion of the project could be assumed high.
Indicator 2: The number of the	This is an indicator for the number of success of fee-based

[23] The PDM in Japanese language stated this indicator as "Satisfaction ratings (evaluation) by *trainees",* although PDM in English states it as "satisfaction by students and *trainees*" as in Table 4. The beneficiary survey for the students and the graduates was conducted in the ex-post evaluation for studying the status of achievement of this indicator.

[24] Interview with the ITBU manager and the Japanese expert.

[25] Overview of beneficiary survey is shown below.

(1) Survey Method: distribution of questionnaire and collection, and interviews based on questionnaire.

(2) Number of target survey persons and number of valid answer:

		Questionnaire (Including Interview)			Interview results
		Total No.	Sent	Collected	
Students		70	60*	38	10
Graduates	Total number	168	114*	41	10
	(Savannakhet**)	(5)		(4)	(4)
Lecturers		12		6	6
Organizations/ Companies	Employing graduates		4	1	1
	Not employing graduates		13	5	5

*The questionnaire was distributed to 114 graduates and 60 current students out of a total of 168 graduates and 70 current students), whose email address were available.

**The ex-post evaluator conducted interviews in Savannakhet to observe differences in graduates who live in Vientiane city and local areas. The interviewees were all lecturers in the IT sector at National University of Savannakhet.

[26] There were four questions for evaluation of lecturers (1) Punctuality, (2) Scope of lecture, (3) appropriate explanation, and (4) appropriate instruction content.

Indicator of Output3	Status of Achievement of the Indicators at the time of Project Completion
success of the system development in the ITBU is increased. ＜not achieved＞	system development. As indicated in Indicator 2 of the Output 2, there is no successful example[27] due to no recorded fee-based system development.

Output 3 aimed to strengthen teaching capacity of lecturers. In the survey of lecturers of ITPM at the time of the ex-post evaluation, it was found that lecturers had continued to improve their skills, by aiming at passing various commercial examinations of relevant IT techniques from the project implementing period to the time of ex-post evaluation (Table5 and Column 1 as reference). Every kind of effort by lecturers to pass examinations is regarded as very effective in improving their practical skills and teaching capacity. Strengthening the instruction capacity of lecturers has been realized continuously.

Although there is no record or successful example of achievement of fee-based system development, the beneficiary survey revealed that the satisfaction rate of students for the lecturers was mostly high. Therefore, it can be regarded that the capacity of lecturers was strengthened to the expected level, and Output 3 was mostly achieved.

Table 5　Number of Lecturers who Passed a Commercial Examination and Certificate as Instructor (at the Time of Completion of the Project)

（person）

Commercial Certificate	Lecturer of NUOL	Visiting Lecturer
Oracle SQL 11g	4	3
Oracle OCA 10g	1	1
Oracle OCJP (Java)	2	1
Cisco CCNA4.0	3	0
Vmware ICM	1	0
Microsoft MTA:Software Development Fundamental	8	0
Microsoft MTA:Windows Server Administration Fundamental	3	0
Instructors' Certificate		
Cisco CCNA Instructor	5	5

Source：IT Department of the Faculty of Engineering, the NUOL

[27] According to the Head of IT Department.

Column 1：Improving Practical and Teaching Skills of Lecturers

The project encouraged lecturers to obtain world standard qualifications to objectively show the level of instruction and practical skills in software engineering of ITSC lecturers to the government and private persons concerned with the IT sector, and to standardize the level of lecturers that should be maintained after project completion.

Up to the time of project completion, 10 lecturers (including visiting lecturers) obtained eight international standard qualifications such as Oracle SQL 11g, etc. It should be noted that one of them passed the VMware Install, Configure, Manage (ICM) examination, which requires advanced knowledge and techniques.[28]

According to interviews of lecturers at the time of the ex-post evaluation, it was found that, the capacity of lecturers had improved through preparing for obtaining the qualifications and passing the examinations; and as a result, they were able to teach as a specialist of the relevant subject of which obtained a qualification.

Lecturers also pointed out that they could understand the relevant techniques in depth, and the range of instruction content was widened by the effort needed to understand English materials and prepare examples in Lao language. More students wanted to attend classes of lecturers with qualifications, and the lecturers' qualifications received positive evaluation from students.

In an interview in the ex-post evaluation, Lao ICT Commerce Association (LICA) which conducted the IT market survey in the private sector in this project, also commented in the interview that instruction by lecturers with specific technical standards was important to maintain the quality of education.

Besides obtaining qualifications, and designing and setting up a network for the IT Department's building, the lecturers also received an order from outside (free of charge) to develop a software program - a sketch map program for clearance of an unexploded bomb for UXO Lao[29] - with support from a Japanese expert. A lecturer worked as a project manager in

[28] For example, it costs about 500,000 yen for 4-5 days' training on the VM ware ICM program. (source: VM Ware Inc. website http://campaign.vmware.com/imgs/apac/jp_dwn/PDF/vmw-edu-cal-jp.pdf?elqTrackId=028421426a1c41c8a9b4c7ab43c98726&elqaid=199&elqat=2 accessed on 27 March, 2017). The lecturer passed the examination studying on his own, without taking this training (interview with Head of IT Department).

[29] Lao National Unexploded Ordnance Programme was established in February 1996 as a governmental organization which specializes in mine clearing under the Ministry of Labour and Social Welfare. UXO Lao's main tasks are interviews with neighboring residents, elaborate survey and information collection regarding location of mines based on the military plan in the past which was provided by US forces. Through these tasks, UXO Lao aims to decrease casualties due to unexploded bombs and to increase land that people of Laos can utilize for social and economic development and increase in food production.(source: UXO Lao Website http://www.uxolao.org/index.php/en/organization/background accessed on 27 March, 2017) The Japanese Government supports South-South cooperation between Laos and Cambodia on the unexploded bomb/mine sector and technical transfer in bomb disposal by providing Bachelor course and exercise to UXO Lao, and reconstruction of the Training Center for bomb disposal (source: The Ministry of Foreign Affairs of Japan website

these tasks, and this experience was effective for instruction to students and improving the capacity of the lecturer.

Instruction on software techniques to protect from viruses and cyber-attack in the short-term course for the National Computer Emergency Response Team was realized because of the enhancement of lecturers' capacity.

＜Output 4＞

Output 4 was "ITSC and master course, which is planned to be established, for the practical software engineering and business skills are developed". As summarized in Table 6, three indicators had been achieved completely.

Table 6　Achievement of Output 4

Indicators for Output 4	Status of Achievement of the Indicators at the time of Project Completion
Indicator 1: Satisfaction ratings (evaluation) of the overall ITSC are enhanced by students and trainees. ＜Achieved＞	Satisfaction for overall ITSC by students in small groups of interview survey for the evaluation at the time of completion was high, with an average of 4.5 in five evaluation ranks. Questionnaires showed 95% on the average of the 15 ITSC graduates who responded to the beneficiary survey at the time of ex-post evaluation evaluated as 'very satisfied' or 'satisfied' with the whole course[30].
Indicator 2 : The curriculums, syllabi, and learning materials are regularly updated. ＜Achieved＞	At the time of transition from ITSC to ITPM, the curriculum had been revised. Afterwards, a private academic program[31] was utilized for the curriculum, which was renewed as a regular mechanism. Furthermore, under guidance from the Japanese expert, ITSC lecturers updated the syllabus, wrote a material, and obtained necessary techniques for development and updating of the syllabus and materials for ITPM course.
Indicator 3 : The curriculum	From 2010 until 2012 the Curriculum Board was held

http://www.mofa.go.jp/mofaj/gaiko/oda/data/zyoukyou/ngo_m/e_asia/laos/141112.html accessed on 27 March, 2017).

[30] Questions were: (1) difficulty of the subjects; (2) curriculum suitability; (3) satisfaction with personal computer (PC), software, references used in the course; (4) whether capacity and knowledge had been improved. Overview of the whole beneficiary survey is given in footnote 25.

[31] For example, the Project introduced ITSC a mechanism in which student can practice by web-based curricula that correspond to world standard qualification examination, on-line test, using real equipment/machine through 'Cisco-networking Academy' of Cisco System, Inc., which develops network systems. In addition, lecturers have an opportunity to continue education and establish a community with their peers using this mechanism.

Indicators for Output 4	Status of Achievement of the Indicators at the time of Project Completion
board is annually held with the external knowledgeable persons (from the government and industry). ＜Achieved＞	every year with participation of relevant government agencies and private companies, and ITPM curricula were established. The Curriculum Board meeting was not organized in 2013 since it was immediately after establishment of the curriculum.

As indicated in Table 6, the course was highly evaluated by ITSC students at that time, and their satisfaction rate was high.

ITPM commenced as a continuation of ITSC, and a system was established so that the curriculum of ITPM would be automatically updated. Course lecturers could obtain necessary skills for development and revision of syllabus and materials, receiving guidance from Japanese experts. The Curriculum Board was conducted regularly the ITPM curriculum was established with participation of public and private sectors.

Therefore, it is regarded that the status of development of ITSC and ITPM, which was planned to be established, reached the expected level. It can be said that Output 4 was achieved.

＜Output 5＞

Output 5 was “Collaboration among the government, industry and academia is reinforced”. As summarized in Table 7, two indicators had been achieved at the time of project completion and an exchange with industry and government staff was realized, and it can be concluded that the Output was achieved.

Table 7　Achievement of Output 5

Indicators for Output 5	Status of Achievement of the Indicators at the time of Project Completion
Indicator 1 : Joint seminars among the government, industry, and academia are annually held.＜Achieved＞	Joint seminars were organized with industry, academia and government every year until 2013, the time of project completion
Indicator 2 : Lectures by the visiting lecturers from the government and industry are delivered at a constant rate. ＜Achieved＞	By the time of project completion, five visiting lecturers from industry and academic institutions conducted lectures for ITSC/ITPM and 69 short-term courses.

3.2.1.2 Achievement of Project Purpose

Project Purpose was "Human resources are developed according to the IT service market through the ITSC by the IT Department of the Faculty of Engineering at the NUOL". Level of achievement of the indicators is summarized in Table 8.

Table 8 Achievement of Project Purpose

<table>
<tr><th>Indicator</th><th>Actual</th></tr>
<tr><td><u>Indicator 1:</u> Evaluation of graduates and trainees working for the domestic IT service companies, government organizations, and IT user corporations is enhanced.
＜Achieved＞</td><td>In the telephone interviews conducted by the Project in March 2013 with 11 major companies[32] where ITSC graduates were employed, an evaluation of ITSC graduates by employer was 3.7 out of 5 ranks of evaluation.
According to the former JICA expert, this project was highly evaluated at the time of project completion from the banks etc. which were the graduates' major employers.
Beneficiary survey at the time of ex-post evaluation revealed that all the ITSC graduates (15 persons) answered that the value of completion of the course was highly evaluated by their workplaces. In the interviews of companies employing many graduates conducted in the same survey,[33] there were comments such as 'ITSC graduates are competitive with the persons who studied and came back from abroad such as Vietnam, Thailand, India, Malaysia in practical work', and 'Because of the contribution of ITSC graduates, the level of IT operation in the companies jumped. Practical techniques were applied in employment examinations which made the examination high level'. From these comments, the companies' evaluation of graduates is regarded as very high.</td></tr>
<tr><td><u>Indicator 2:</u> More than 80% of the graduates from ITSC will (re)start to work as the IT service engineers
＜Achieved＞</td><td>As indicated in Table 9, at the time of project completion almost 100% of graduates could find employment in the IT industry.
Table 9 Employment rate of graduates in IT service market
<table><tr><td>Year</td><td>ITSC-1st batch (2010/11)</td><td>ITS-2nd batch (2011/12)</td></tr><tr><td>No （%）</td><td>34 （94%）</td><td>28 （96%）</td></tr></table>*Figures indicate the number of graduates, and figures in brackets</td></tr>
</table>

[32] 11 companies are private companies and public organizations with which 48 out of 59 graduates found employment.

[33] Interviews were conducted at Lao Development Bank (5 ITSC/ITPM graduates), BCEL (7 ITSC/ITPM graduates), Lao IT Development Co., Ltd (1 ITPM student), CP Laos Co., Ltd (1 ITPM graduate), 2 IT equipment sale/repair shops in Vientiane Capital and Savannakhet (no graduates work there). In order to confirm ITPM's popularity, type of work of IT human resources, content of IT service and the need, a major sales/repair shop was selected for survey regardless of whether any graduates were employed there.

<table>
<tr><th>Indicator</th><th>Actual</th></tr>
<tr><td></td><td>indicate employment rate in IT service market.
Source：IT Department in the Faculty of Engineering, NUOL</td></tr>
<tr><td><u>Indicator 3</u>:
The number of trainees [34] (attending the short -term course) of the postgraduate course [35] is increased in the Lao PDR.
＜Achieved＞</td><td>As revealed in Table 10, the total number of trainees[36] of short-term courses at the time of project completion was 860 persons. The cumulative number of trainees for the same courses in Laos has increased every year.

Table10 Number of short-term courses and trainees[37] (person)
<table>
<tr><th>Year</th><th>No. of course</th><th>No. of participants</th></tr>
<tr><td>2009</td><td>1</td><td>12</td></tr>
<tr><td>2010</td><td>15</td><td>146</td></tr>
<tr><td>2011</td><td>18</td><td>210</td></tr>
<tr><td>2012</td><td>26</td><td>322</td></tr>
<tr><td>2013</td><td>18</td><td>170</td></tr>
<tr><td>total</td><td>78</td><td>860</td></tr>
</table>
Source：ITBU</td></tr>
</table>

As mentioned above, ITSC graduates were highly evaluated by the companies. The percentage of graduates finding a job in IT service companies exceeded the target, and the number of trainees on ITSC short-term courses increased. Three indicators of project purpose had been achieved. It can be regarded that human resource development to meet demand of IT service market through ITSC was realized as expected. Therefore, the project achieved its purpose.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

The overall goal of the project was “IT service industry is well-developed in the Lao PDR”.

（1） Achievement of Overall Goal

Two indicators for the overall goal of this project were macro indicators. As shown in Table

[34] It is described as ‘ITSC（short-term course）’ in Japanese version of this report, however, the evaluator did not put ‘ITSC’ in accordance with PDM in English.

[35] There is no expression as ‘of the postgraduate course’ in Japanese version of this report, however, the evaluator put it in accordance with PDM in English.

[36] This project classified the trainees according to the following definitions: (a) Attendee: those attended more than 80%, but did not pass the final examination; (b) Disqualification: those attendance rate was 79 % or less than 79%; (c) Passer: Those attendance was above 80% and passed the final examination. The number of trainees in Table 10 is the total of (a)-(c).

[37] The number of trainees increased a lot in 2012 because the building of IT Department and short-term course was completed before that year. In addition to this, enrichment of equipment and training content were well known. The number of trainees decreased in 2013 because the lecturers were too busy, which limited the number of courses. IT Department seeks for a measure to increase its income without largely increasing the number of course. (Interview with the Head of IT Department)

11, at the time of the ex-post evaluation no existing data was available for utilization. Due to this, the status of achievement for the overall goal was not confirmed.

Table 11　Achievement of Overall Goal

Overall Goal	Indicators	Status of Achievement at the time of Project Completion
IT service industry is well-developed in the Lao PDR.	Indicator 1 : The ratio of the IT services in the GDP is increased[38]. ＜ Achievement level is unknown due to lack of data＞	GDP of Laos in 2013 was 11.18 billion USD[39]. Growth rate was maintained about 7% during the past 10 years.[40] There is no available data on the percentage of IT service industry in GDP. Therefore, the ex-post evaluator could not confirm the status of achievement of indicator.
	Indicator 2 : The ratio of the people working for the domestic IT service industry in the working population is increased[41]. ＜ Achievement level is unknown due to lack of data＞	It is estimated that employment population of Laos in 2013 is about 3810,000 people[42]. There is no available data on the percentage of IT service employees. Therefore, status of achievement of indicator could not be confirmed.

As the Project only targeted NUOL for IT human resource development, the effect on macro indicators in Table 11 is limited. Therefore, even if there was available information that could be used for these indicators at the time of ex-post evaluation, it would be difficult to judge whether this project contributed to achievement or not.

Therefore, it could not say that the appropriate indicators were set up. On the other hand, through implementation of this project, the capacity of lecturers in IT Department, Faculty of Engineering, NUOL was improved and strengthened. In addition, ITSC and ITPM were established. ITBU which was established in IT Department has properly operated short-term courses, and numerous IT human resources have been produced every year. As mentioned above,

[38] There is no expression of 'is increased' in Japanese version of this report, however, the evaluator put it in accordance with PDM in English.

[39] Source: World Bank (http://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=LA accessed on 8 February 2017)

[40] Source: CIA the World Factbook (https://www.cia.gov/library/publications/the-world-factbook/geos/la.html accessed on 7 February, 2017)

[41] There is no expression of 'is increased' in Japanese version of this report, however, the evaluator put it in accordance with PDM in English.

[42] Source: Japan Bank for International Cooperation 'Investment environment of Lao/July 2014' (http://www.jbic.go.jp/wp-content/uploads/page/2015/09/40674/inv_Lao191.pdf accessed on 7 February 2017)

an evaluation of ITSC/ ITPM course by trainees was mostly positive, and cooperation among private-academic-government was promoted by joint seminars and engagement of visiting professors from private and government sectors. Most ITSC graduates were employed in the IT industry and obtained significantly high evaluations from their workplaces. Short-term courses have taken place every year. These indicate that the project goal, strengthening and development of IT human resource, has been realized. The level of achievement of the overall goal could not be measured by the indicators due to no existing available data. Nevertheless, it can be said in this ex-post evaluation that the project contributed to the development of the IT service industry, which is the overall goal, for the following reasons. The ITPM course and short-term course continue to produce graduates. Almost 100% of graduates found jobs in IT-related companies or work in the IT-related division in organizations. The evaluation of graduates from their workplaces is very high. An improved level of IT-related operations in their companies and advanced scope of knowledge have been realized.

（2） Contribution of the Project to Achievement of Overall Goal

As mentioned above, the level of achievement of the overall goal could not be measured by the indicators. At the same time, several items that can be considered effects of the project were generated, continued and developed, and contributed to achievement of the overall goal to some extent. These have been confirmed in the ex-post evaluation as follows.

- The smooth establishment of the ITPM course can be cited as an impact of this project. At the time of planning of the project, NUOL planned to set up a Master's program in each Faculty, envisaging that it would establish the Master's course in the Faculty of Engineering. After developing the curriculum of ITSC established by the project, the ITPM curriculum was developed by the Curriculum Board that consists of IT Department's lecturers, government organizations, and private companies, and the ITPM was smoothly established. As a result, NUOL could establish the ITPM in January 2013 during implementation of the project, and received the first batch for ITPM at the same time.
- ITPM and short-term courses of ITBU have been maintained at the time of the ex-post evaluation. These courses produce a certain number of graduates every year. Applicants for short-term courses exceed the quota every year, and the number of enrollments to ITPM is stable. In addition, out of ITPM students (69 persons), 93% of 38 students in the beneficiary survey at the time of ex-post evaluation, evaluated 'very satisfied' or 'satisfied' on the lecturer performance.[43] Lecturers' practical skills and teaching competencies are

[43] The evaluation for the lecturers was conducted by setting four criteria, namely, (1)very satisfied, (2)satisfied, (3)middle and (4) no good.

well evaluated, since they continue to strive to pass commercial examinations as mentioned in Column 1.

- According to the beneficiary survey, 36 graduates, out of 37, who replied to the questions, worked in IT-related companies or working in the IT division in an organization.[44] The evaluation of these graduates by their workplaces was very high. They contribute to improving the scope of knowledge and upgrade the level of IT-related operations for their companies.[45]
- The ITBU short-term course is maintained. From completion of the project until the time of ex-post evaluation, the accumulated total number of trainees on the courses was 1,330 persons, which shows that ITBU can receive large-scale order of training from outside.
- With the support of the project, IT Department, Faculty of Engineering, NUOL set up a test center that is able to conduct a Pearson Test of English Academy, a commercial software qualification.[46] At the time of the ex-post evaluation, ITBU has operated the implementation of this examination. The number of those taking the exam has increased year by year with a background that private companies are seeking a higher level of IT human resources. In addition to implementation of the short-term course, ITBU has been contributing to development of human resources for the industry development of IT field in Laos through implementation of the examination.

[44] Type of work of 36 ITSC/ITPM graduates as understood at the time of ex-post evaluation is shown below (multiple answers).

Job title	System Analyst	Network Engineer	Programmer	Web Programmer	Web Designer	IT Consultant	IT Trainer
No.	7	17	6	8	7	2	12
Job title	Graphic Designer	Server Administrator	Computer Engineer	Database Management	Database Programmer	Telecom Engineer	
No.	2	12	8	7	8	4	

[45] In addition to reference to Column 3, according to the interview to all three companies visited in the ex-post evaluation and beneficiaries survey to graduates, all 41 respondents answered that the graduates are receiving high evaluation from their workplaces.

[46] Commercial qualification test of IT series is conducted as CBT (Computer Based Testing). Before starting of the project, there was no CBT facility in Laos and people could not take the examination in Laos.

Column 2：Student's Contribution to Society through Fieldwork

The majority of ITPM students have been sent by their companies. They are studying while working in their companies.

In the fieldwork as part of the course, Mr. Phorasim of the ITPM 1st batch, constructed a security system for an automatic payment system required by Lao Development Bank (LDB), where he was working. Specifically, he introduced the Virtual Private Network (VPN [47]) to protect customer information.

Mr. Phorasim (second from the right)

The fieldwork team consists of three persons including Mr. Phorasim. The fieldwork took six months, including visits to pilot project sites. Since he studied at ITPM while working at the bank, it was difficult for him to adjust the schedule for the fieldwork. However, by conducting the operation at weekends, he completed the task within the time set.

By introduction of VPN, the security system for automatic payment system of the bank was greatly improved. In the four years since its introduction there has been no problem with security.[48]

3.2.2.2 Other Positive and Negative Impacts

Negative impacts by implementation of the project were not found.

As stated above, the project purpose of development of human resources to meet the IT service market through ITSC has been achieved by implementation of the project. In addition, regarding the overall goal, it can be said that it contributed to the development of the IT service industry to some extent. Therefore, the effectiveness and impact of the project are high.

Column 3：Outstanding Performance of Graduates in Their Company

The ICT Center of Banque Pour Le Commerce Exterieur Lao Public（BCEL）, which is one of the largest government commercial banks in Laos, develops network, security, programming and internet banking, and provides technical support to other departments of the bank. Expecting all their 42 employees assigned in the ICT Center to get a Master's degree, the bank has sent two

[47] VPN is virtual internal network constructed through public communication circuit of telecommunication operator. In addition, it indicates the telecommunication service that can construct such network. It is used for base-to-base connection of internal network, and can communicate with remote base station as communication within internal network of its own company.

[48] According to Mr. Phorasim.

or three staff to study ITPM every year. At the time of ex-post evaluation, there are seven ITSC and ITPM graduates working in the center.

The IT operations in the center are diverse, and ITSC and ITPM graduates are responsible for system development, network, web design, etc. using their expertise. Practical techniques are required for working in the center.

According to an interview with the Head of the ICT center, ITSC and ITPM graduates, who received practical education through lectures and fieldwork etc., are valuable staff for the bank. The Head of ICT Center pointed out there are staff in the Center who studied abroad - in India, China, and Malaysia. However, there is no difference between these staff and the graduates. The Head added that the staff who have four to five year's work experience in the bank can also improve their competencies further by studying at the ITPM.

One of the ITPM graduates is playing a key role in the team for construction of an internet banking network According to the Head of the ICT Center, if the center had not had him the construction of the network would have been outsourced to foreign companies, or the center would have used a system constructed by foreign companies. Through his performance, the bank itself could develop a network which is suitable for Laos. In addition, the staff are now capable of dealing with operations which require advanced technology, such as development of a program for a gateway[49] to link with a security company.

3.3 Efficiency (Rating：③)

3.3.1 Inputs

The plan and actual amount of inputs of the Project are listed in Table 12.

Table 12　Plan and Actual Amount of Inputs to the Project

Inputs	Plan	Actual
（1）Experts	7 experts Consider dispatch of short-term experts other than above mentioned experts	● Long-Term (3 experts) ● Short-Term (13 experts including 4 Japanese experts and 9 experts from third countries)
（2）Trainees received	Training of counterpart personnel in third countries (number of participants is not indicated)	3 participants (Training in Thailand)
（3）Equipment	IT-related equipment and other	Equipment for network, PC,

[49] Gateway is a mechanism or device that makes possible intercommunication of data which has different specification (protocol) in network and system. (source: ASCII Digital Glossary http://yougo.ascii.jp/caltar/ICT accessed on 28 March, 2017 (Japanese language)).

Inputs	Plan	Actual
	necessity equipment	software, and office equipment
（4） Facilities	Construction of classroom and IT laboratory	Construction of lecturers' room, IT laboratory, and renovation of LJTIC [50] in Faculty of Engineering, NUOL
（5） Others	Operational expenses: No figure mentioned.	Operational expenses: Total 40 million yen[51]
Japanese Side Total Project Cost	Total 380 million yen	Total 345 million yen
Laotian Side Total Project Cost	1. Assignment of counterpart officers 2. Expenses necessary for employment of visiting lectures 3. Provision of the project office and facilities necessary for the project implementation 4. Others: Administrative and operational costs, connection charge of high-speed internet, running costs for electricity, water, transportation cost, etc.	1. Assignment of counterpart officers for 28 persons (including office staff) 2. School building of IT Department, Faculty of Engineering, NUOL, Office space for JICA Experts 3. Local cost, payment of lecturers at IT Dept., electricity, water charges, and internet telecommunication costs for the office of the JICA Experts

Source: Internal document of JICA, the Ex-Ante Evaluation Report, the Report of the Terminal Evaluation, and interview at the Ex-Post Evaluation

3.3.1.1 Elements of Inputs

In addition to the Japanese experts, third-country experts invited from Thailand conducted the Microsoft MTA Training in Thai language, which is more familiar than English for Laotian people. A third-country expert from Singapore also conducted technology transfer which related to VMWare (software). In addition to the input indicated in the above Table, the Laos side bore the cost of purchasing 13 computers to replace those stolen in July 2010.

[50] Half of the Lao Japan Technical Training Center（LJTTC）building was repaired for utilizing as an incubator.
[51] According to JICA exchange rate in FY 2016 (349,080 USD).

3.3.1.2 Project Cost

Actual Project cost was 345 million yen against the planning budget of 380 million yen, which was in 90% of planning ratio.

3.3.1.3 Project Period

The project period was 60 months from December 2008 until November 2013, which was implemented as planned (100% versus the plan).

In light of the above, both the project cost and project period were as planned. Therefore, efficiency of the project is high.

3.4 Sustainability (Rating：②)

In order to measure sustainability of the project, the ex-post evaluation confirmed and analyzed several parameters to see the ITPM, established by the support of this project at Faculty of Engineering, NUOL, the project implementing agency, continue to provide education which meets the needs of industry. These parameters are whether policies were developed, if the management system of ITBU and LIBIC of IT Department, Faculty of Engineering, NUOL is well-established, if the techniques of the lecturers of ITPM is sufficient, and whether there are any problems regarding financing, etc.

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

At the time of the ex-post evaluation, the 'ASEAN ICT Master Plan 2020' - a policy goal of ASEAN 2016-2020 - highlights eight strategic promotion items, one of which is (5) human capital development to promote development of competitive ICT human resources through setting up qualifications and technology to fulfill the needs of IT human resources at present and in the future.[52] Based on this master plan, the Ministry of Post and Telecommunication (MPT) in Laos is preparing a policy on IT called 'ICT policy (2016-2020)', with top priority on IT human resource development and promotion of IT infrastructure. These policies are expected to continue in the future.

The Ministry of Education and Sports (MOES) is preparing the 'ICT development strategy 2016-2020'. The objectives of this strategy are to strengthen the capacity of ICT lecturers and development of human resources that can use IT. The strategy will be approved by the Laos government soon. In addition, MOES regards ITPM of IT Department, Faculty of Engineering,

[52] Source: 'The ASEAN ICT Master Plan 2020' （https://www.sbs.ox.ac.uk/cybersecurity-capacity/system/files/ASEAN%20ICT%20masterplan%202020.pdf accessed on March 27, 2017. ASEAN also indicated the importance for development of competitive IT human resources in 'ASEAN ICT master plan (2011-2015)'.

NUOL as the only master course in the IT field in Laos at the time of the ex-post evaluation.

In the NUOL strategy for development of education (2016-2020), it is highlighted that NUOL will promote the ICT system development project at an international level, including the e-learning project, until 2030. In addition, the IT Department, Faculty of Engineering, NUOL plans to regularly revise the ITPM curriculum for IT human resource development, and to maintain the standard requiring commercial qualification for engagement as lecturers.[53]

Therefore, the necessary policy system for continuation of the project effects is in place in NUOL and Laos.

3.4.2 Organizational Aspects for the Sustainability of Project Effects

The organization chart of the Faculty of Engineering, NUOL at the time of the ex-post evaluation is shown in Figure 2. The IT Department was established when this project started. Responsibility within the faculty is clear at the time of ex-post evaluation.

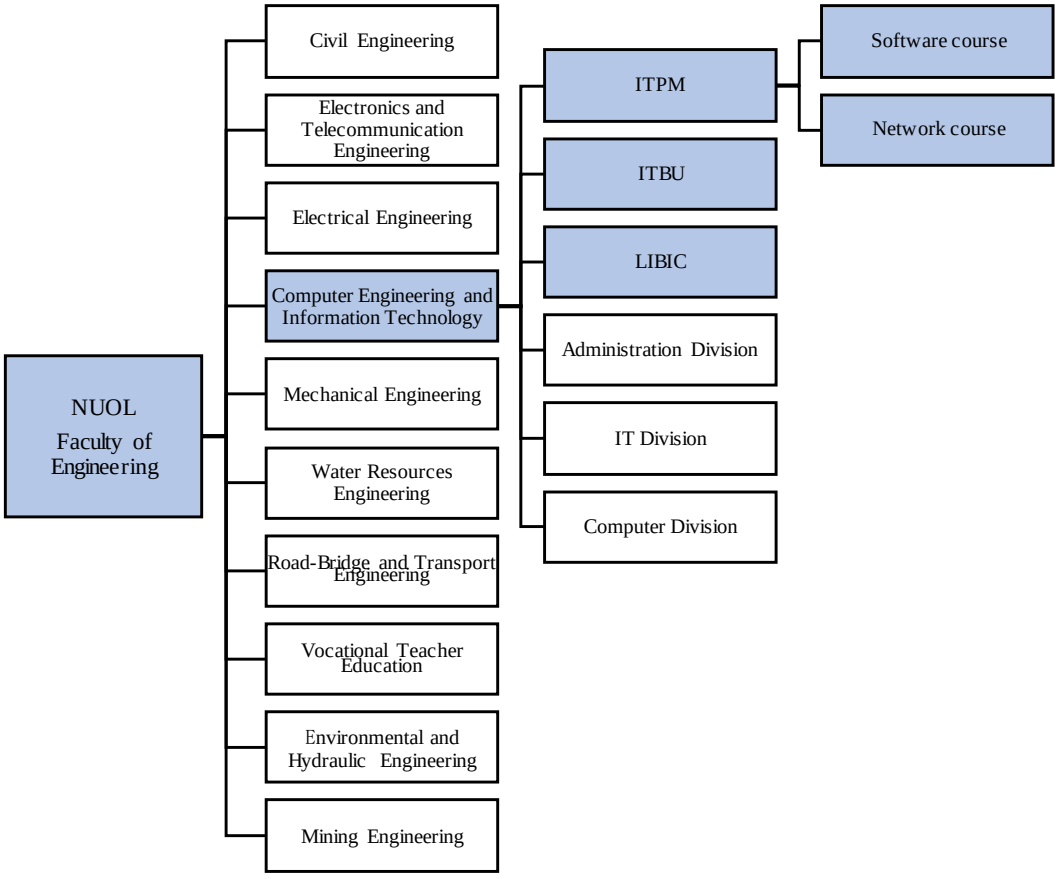

Figure2 Institutional Structure of Faculty of Engineering, NUOL and IT Department

Source：Edited by the External Evaluator based on the website of the Faculty of Engineering, NUOL

[53] The qualifications for lecturers who can teach a Master's Program in NUOL are those who have a Doctoral degree or are an associated professor. These are not required to teach at ITPM of IT Department, Faculty of Engineering, while it is necessary to pass commercial certifications corresponding to the subject.

In 2016 ITPM reached the 5th year since its establishment and its implementation and management are firmly established in the Faculty. All the lecturers of ITPM at the time of project implementation are still working at the IT Department at the time of the ex-post evaluation. The salary (200 USD per month) that lecturers receive from NUOL is barely sufficient to sustain daily life; however, the ITPM lecturers in IT Department can obtain a higher salary (about 500-600 USD + 200 USD from short-term courses per month[54]) when compared to other departments by having classes for ITPM, short-term courses of ITBU and ITPM, and lectures for undergraduates. This is similar to the salary of staff in private IT service companies, and leads to a high retention rate of lecturers.[55]

LIBIC was established inside the IT Department six months before project completion, and a TV Program Production Company[56] occupied a booth from 2014 to 2016. However, all ITSC and ITPM graduates, 26 students (68%) out of 38 students who answered the questionnaire at the time of ex-post evaluation, did not know about the presence of LIBIC.

At the time of ex-post evaluation, the above-mentioned TV Program Production Company has paid the rent fee for LIBIC. However, business activity has not been generated, and according to ITBU, it seems that this company will leave before long. Thus, activity of LIBIC has stagnated, and the budget and staff are in a very fragile situation. There was a plan to increase staff, strengthen activities, and upgrade LIBIC to Department level in the Faculty of Engineering. However, there has been no progress due to the poor office procedure in NUOL. The allocation of budget is also insufficient. At the time of the ex-post evaluation, the Faculty of Engineering expressed its willingness to certainly move forward [57] with procedures for re-organization of LIBIC in fiscal year 2017. MOES also understood the importance of the incubator, and is considering supporting and promoting LIBIC. However, information regarding its feasibility has not been obtained.

Thus, no problem was seen regarding responsibilities in the Faculty of Engineering, NUOL, the number of lecturers who teach ITPM and their retention. However, there remains a problem with the systems of LIBIC inside the Faculty of Engineering.

3.4.3 Technical Aspects for the Sustainability of Project Effects

As mentioned in '3.2.2.1 (2) contribution of achievement to the project's overall goal', the technical level of lecturers of IT Department, Faculty of Engineering, NUOL, has been

[54] At the time of starting the project, it was approximately 100 USD per month (1st Progress Report of the project).
[55] Interview with the Head of IT Department.
[56] The TV Program Production Company was not very relevant to IT. However, the company was accepted upon requesting support in IT techniques. LIBIC provided the service for company registration, and introduced a financial support project for entrepreneurs from the Department of Small Medium Enterprise promotion of Ministry of Industry and Commerce (financial resource from New Entrepreneur Creation Project of ADB).
[57] Comment from the Dean of Faculty of Engineering, NUOL.

maintained and strengthened, and the evaluation of lecturers' technical instruction by the students is mostly high. Lecturers revise the syllabus by themselves every year, and have the necessary knowledge and techniques for revising the curriculum from 2017. Therefore, ITPM lecturers of IT Department have the necessary techniques for continuation of effectiveness produced by the project.

The IT Department expressed concern about the extension of the study period for students or declining the quality level of students in terms of assuring the quality of the IT Department. The followings are some more information about this matter, which seems to be important, although it is not clear how this will impact on sustainability of the project at the time of the ex-post evaluation.

Most ITPM students are sent from their companies. Students are working in the daytime, and struggle with time management to attend ITPM at night. The course takes 2 years. At the commencement of the course, all students completed in 2 years. However, recently a certain number of registered students have taken three years to complete. [58] According to the Dean of the Faculty of Engineering, it is one of the causes of extension of the course completion that many students do not have enough time to discuss the theme of their master's thesis with their lecturers, and they take longer time to select their theme, survey, study, and write their papers.

According to the lecturers and Head of IT Department, in terms of capacity level of students at the time of entry, companies had sent the most excellent people to study at the commencement of the course. However, the level of staff sent has gradually gone down. This has happened because of the thin layer of human resource in the companies. It is a frequent phenomenon in Laos. Declining quality at the time of entry could be one of the reasons that some students could not complete within 2 years. The lecturers are aware that it is crucial to have supplementary lectures for students who have lower capacity, but they cannot implement this because they are too busy.[59]

Two points - know-how on management of incubation and lecturer's technical capacity to support the incubated companies - are necessary to produce the effect of incubation by LIBIC. The staff who is responsible for incubation management has some capacity and knowledge for management. Regarding capacity for technical support of lecturers to the entry companies - there were almost no records of support and no discussion on kind of capacity required; therefore, it is not clear whether problem exists or not.

[58] In NUOL regulations, in the case of unavoidable circumstances it is possible to extend one year in order to complete the course.

[59] ITPM lecturers have an average of 16 hours of lectures per week (10 hours for undergraduate, and 6 hours for ITPM). As reference, working time for Japanese University Professor is 8 hours per week (source: Ministry of Home Affairs, Statistic Department of Japanese Government
http://www.e-stat.go.jp/SG1/estat/List.do?bid=000001017860&cycode=0, accessed on 24 November 2016).

3.4.4 Financial Aspects for the Sustainability of Project Effects

The income of ITPM, IT Department, Faculty of Engineering, NUOL is increasing, as shown in Table 13. The salary of lecturers is not changed every year in the budget from the Ministry of Finance. However, through the implementation of short-term courses and lectures for undergraduate students, ITPM lecturers receive additional income which assures an incentive for continuation of their work. As the number of students taking 3 years for completion increases in fiscal year 2016, classrooms are not fully available, which leads to a reduction in new students and decrease in tuition fees. The enrollment capacity is 28 persons or 42 persons depend on capacity of the classroom. Based on this, the tuition fee income varies every fiscal year. There were 28 students in FY 2016, and the income from tuition fees decreased. However, it is expected that the income from tuition fees will recover in 2017, because 42 students will be enrolled.

Table 13 Financial status of ITPM

（Unit：Kip[60]）

Income

Year	2012	2013	2014	2015	2016
Budget from MOF to IT Dept.	466,124,952	466,124,952	466,124,952	466,124,952	466,124,952
Tuition	816,000,000	600,000,000	1,025,000,000	1,000,000,000	650,000,000
Income of ITBU（Short-course）	NA	389,664,000	238,172,000	517,372,000	75,320,000
Total	1,282,124,952	1,455,788,952	1,729,296,952	1,983,496,952	1,191,444,952

Expenditure

Year	2012	2013	2014	2015	2016
Allocation to lecturers' payment from MOF budget	466,124,952	466,124,952	466,124,952	466,124,952	466,124,952
Allocation to lectures' payment from courses	289,920,000	523,718,400	432,823,200	600,343,200	285,192,000
Activities	342,080,000	332,129,600	591,935,800	604,885,800	312,278,000
Maintenance（building、materials）	184,000,000	114,332,800	226,504,400	286,274,400	124,084,000
ITBU Saving	0	19,483,200	11,908,600	25,868,600	3,766,000
Total	1,282,124,952	1,455,788,952	1,729,296,952	1,983,496,952	1,191,444,952
Balance of incme and expenditure	0	0	0	0	0

*The income from tuition covers two school years.
*Data on income of ITBU up to 2012 is not available.
*Balance of income and expenditure is zero in every year.
Source：IT Department, the Faculty of Engineering, NUOL

[60] JICA exchange rate in FY2016 (1 kip = 0.014470 yen).

Expenditure for purchasing and updating of equipment for ITPM is not included in the budget the Faculty of Engineering receives from Ministry of Finance, as shown in Table 13.[61] This expenditure comes from internal revenue sources - the income from ITPM tuition fees and short-term courses as shown in Figure 3. In 2016, about 10%, one million yen, of internal revenue source has been allocated for that expenditure.

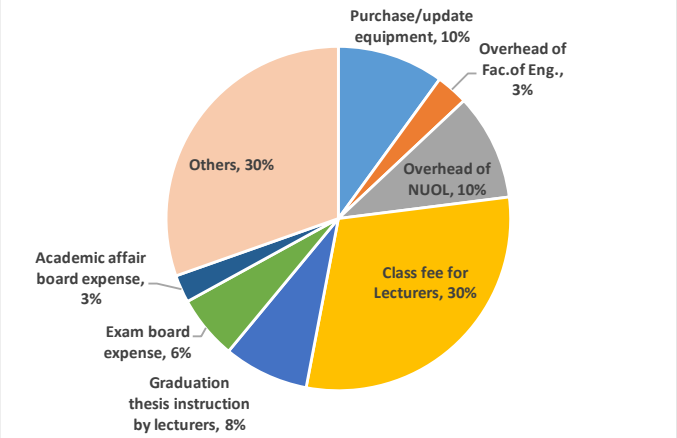

Figure 3 Allocation rate of tuition and income of ITBU (2016)
Source：IT Department, the Faculty of Engineering, NUOL

Most practical training equipment provided by this project has been used at the time of the ex-post evaluation. However, some equipment, such as the Cisco Router 1941, provided by the project as practical training equipment for the ITPM network course, has deteriorated due to frequent use, and the serial port can be damaged easily. To date, the IT Department has made efforts maintain as many equipment as possible in operational condition by replacing parts of the equipment. However, about half of the equipment was not operating at the time of the ex-post evaluation. At the commencement of the ITPM course each student could use one piece of equipment for practical training. However, recently two or three students have to share each piece of equipment. In addition, frequent use is avoided[62] to prevent damage. The course aims to implement lectures that directly link to business practices. Therefore, shortage of training equipment is a serious problem.

The lecturers are also concerned that if such a situation continues, there is a possibility that the practical training cannot be implemented in the future. However, as mentioned above, the budget allocation for updating and purchasing equipment for the ITPM course is limited. Until now damaged equipment has not been updated.[63]

The Faculty of Engineering recognizes the necessity of updating the equipment. The current income of the ITPM course is not enough to purchase, therefore, it is considering increasing tuition fees and the allocation of budget from Ministry of Finance for the cost of updating equipment. The idea is to find the way to purchase even one piece of ITPM equipment that has

[61] Budget in Table 13 shows only lecturers' salary received from the Ministry of Finance. General operating costs, technical costs, fixed assets costs for operation, infrastructure maintenance costs, and so on, are mainly allocated for undergraduate. Infrastructure maintenance cost for ITPM course is generally covered by tuition fees income.
[62] Interview with ITPM lecturers and ITPM graduates.
[63] For example, if Cisco 1947 is purchased in Thailand and imported to Laos, it will cost 700,000 to 800,000 yen, which is too expensive for the IT Department.

high priority to be updated each year.[64]

Given the above findings, there is no problem in policy background and technical aspects, while some minor problems have been observed in terms of the organizational aspect and problems in financial aspect of the implementing agency. Therefore, sustainability of project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented at NUOL with the aim of fostering human resources to meet the needs of the IT service market. At the time of planning and completion of the project, promoting the IT industry and fostering human resources for this were important policy targets for the country. The need for advanced IT human resources in the industrial sector of the country has been also high, and consistent with the country's development policy and needs. At the time of planning, the advanced level of human resource development for strengthening private sector was a key area in Japanese assistance policy to support Laos Government. Therefore, the relevance of implementation of this project is high.

Most graduates of the ITSC at the IT Department, Faculty of Engineering, NUOL have been employed by IT companies in the country, and have a good reputation in their places of work. Short courses have been conducted by ITBU every year. These courses are implemented as seminars for IT industry human resources outside the university, utilizing a part of IT related subjects (lecture modules) which consists of ITSC. This realizes the project objective of developing and enhancing IT human resources. Since this project also contributed to the development of the IT industry in Laos to some extent, which was its overall goal, effectiveness and impact are high. In addition, the project cost and period were as planned. Therefore, efficiency is also high.

The national policy and NUOL system to maintain the ITPM, which was established based on the ITSC, are expected to continue in the future. The operation system of IT Department in the Faculty of Engineering at NUOL is appropriate, apart from inadequate operation system of LIBIC.

The techniques of lecturers in ITPM have been maintained without any problem. There is a minor problem with financial operation, as no budget has been allocated to update equipment required for practical work in the ITPM network course. Therefore, the sustainability of effectiveness through implementation of this project is fair.

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

[64] Interview with the Head of the Faculty of Engineering.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

(1) Updating Equipment for ITPM Network Course

About half of the equipment for practical training in ITPM network course provided by the project is damaged due to deterioration, and is not in a condition to be used. It has become an obstacle to practical work in the course.

If deterioration and damage of this equipment continues in future, it may threaten the practical training and continuation of the course itself. In order to solve this problem, it is expected that Faculty of Engineering, NUOL consider requesting budget from the government, together with seeking for ①increased income for the IT Department, ②increased contribution (donation) of equipment from outside, and so on. For ①, increased income from tuition fees can be considered by increasing ITPM tuition fees and increasing the unit price of short-term courses[65] with higher quality and market needs. Developing an e-learning system for ITPM and short-term courses in order to fulfill the IT education needs of human resources in local areas can also be considered. For e-learning, it could be effective to utilize the ICT center, which promotes ICT projects in NUOL, and the Research Institute for Development and Innovation,[66] which is planned to be established in NUOL with support from the 2nd Higher Education Enhancement Project (approved in September 2016) of ADB. In addition, undertaking fee-based services by ITBU through fostering collaboration with related government organizations and other projects supported by Japan can be one option to increase the income of the Faculty. For example, energy-efficient data center[67] was founded in November 2016 in Laos with support from the New Energy and Industrial Technology Development Organization (NEDO) of Japan, which supported a feasibility project. By enhancing collaboration with the Ministry of Science and Technology of Laos Government which operates the Center, ITPM lecturers may be able to join the feasibility project. It is recommended that ITPM lecturers upgrade their capacity by obtaining this kind of opportunity, and seek fee-based orders by ITBU in future. As for ②, LICA, graduates and companies which employ ITPM graduates can be asked for a donation to support the network

[65] Income from short-term courses is fixed as course hours X time unit price X number of participants.

[66] The Research Center aims to strengthen research and development in modern scientific technology, to share information with government and other organizations with responsibility in order to contribute to social and economic development of Laos. Environment research center, Lao-ASEAN Education Center, Incubation Center, and China research Center will be established in the Research Center. It seems that the relationship between the incubation center and LIBIC under IT Department, Faculty of Engineering of NUOL will be discussed in NUOL（interview with lecturers）.

[67] The high-quality and energy-efficient data center is a container type, which is possible to set in one-third construction period compared with a conventional building type data center. The data center in Laos is expected to be operated by 40% less energy consumption compared with the conventional one. In the feasibility project, NEDO will operate data center in appropriate way in Laos around for a year until February 2018 to verify the effect to reduction of greenhouse gas emissions by utilizing the Joint Crediting Mechanism (JCM). (source: website of NEDO, http://www.nedo.go.jp/news/press/AA5_100681.html accessed on 24 February, 2017）

course.

(2) Activation of Incubation at LIBIC

As the first place to operate an incubator in Laos, LIBIC had been set up in the IT Department, Faculty of Engineering, NUOL. At the time of the ex-post evaluation, however, the necessary budget and human resources were not allocated to LIBIC, and not even one company occupied the booth. Students do not know much about LIBIC, and very few graduates and private companies interviewed were familiar with LIBIC. In order to activate LIBIC, it is important to first allocate necessary budget and human resources. Public relations and awareness creation activities for students and entrepreneurs are also indispensable. For instance, ITBU can introduce LIBIC to students of ITPM and MBA course in NUOL as a future place to start business. LIBIC could publicize itself in some private events for incubators.

As for a collaboration with the above-mentioned Research Institute for Development and Innovation of NUOL, LIBIC can play a role in developing incubators in the Institute by utilizing its knowledge and experience. The manager of LIBIC has accumulated her knowledge and experience as the representative of Laos incubator by collaborating with incubators in and outside of Laos. On the other hand, other Faculties in NUOL have very limited experiences of incubators yet. It is considered that the incubator of LIBIC, the Faculty of Economics and Business Administration, and Laos-Japan Institute (LJI) established in NUOL will play a key role for new incubators. Sharing its knowledge and experience with the incubator of the Research Center, LIBIC is expected to enhance its programs such as start-up seminars and business support for students and young entrepreneurs.

LIBIC will be activated through these measures, which will accelerate development of IT entrepreneurs. It is expected that an activated LIBIC will contribute to empowerment of IT entrepreneurs and increase of human resources in the IT service sector, which will lead to development of the IT industry.

4.2.2 Recommendations to JICA

It is expected to support the utilization of the above incubator by other JICA projects in Laos, for activation of LIBIC incubator. For example, 'The Project on Capacity Building for Supporting Private Sector Development and Japanese Investment in Lao P.D.R. through LJI of NUOL' (September 2014 - August 2019) has provided instruction to students who aim to obtain an MBA. This project has considered collaboration with the incubator of LIBIC as one of its activities[68]. The Japanese expert of the project has proposed providing necessary MBA-related training for

[68] For Output 1 of PDM of the project, 'Capacity of LJI for private sector human resource development is strengthened.', there is activity 1-8, 'Collaborations between LJI and incubator function under the Faculty of Engineering to support their entrepreneurship development activities are considered.'

human resources who move into the incubator of LIBIC, wanting to start a business. JICA can positively support such a proposal by creating a system for those two projects can share their information periodically.

4.3 Lessons Learned

(1) Setting Realistic and Measurable Indicators for Overall Goal and Careful Consideration of Means of Verification

The indicators of the overall goal of the project (increased ratio of IT industry in GDP and increased ratio of population in IT industry) were too large to expect to be reached as the result of support to one national university. Means of verification were not available without additional surveys, which did not allow the evaluator to verify the achievement of the overall goal in the ex-post evaluation. Not only the time of planning but also in early stages of implementation it is necessary to have discussions on the overall goal, its indicators, and means of verification, and to set and revise these appropriately.

The project set an indicator as students' 'satisfactory rate is improved' to measure improvement of lecturers' competencies. During its implementation, the project conducted a questionnaire survey to measure the achievement of the indicator. However, the results of the survey were not compiled nor analyzed quantitatively due to cultural background in Laos in which it is not welcomed to evaluate lecture individually by his/her students. Therefore, quantitative analysis was not conducted. Nonetheless, alternative indicators or means of verification were not considered. It is important to propose alternative indicators and means of verification to measure the achievement of indicators appropriately in such cases.

(2) Ensure Updates of Equipment Provided to IT Sector

Half of the equipment for the network course provided by the project has been damaged due to deterioration, and is not available. If this continues, it may cause serious effects to practical parts of the course.

In a support to the sector, such as IT, in which technology progresses in high speed and requires continuous updating of training equipment, it is essential to facilitate the implementing agency to firmly recognize the importance of periodic upgrade of equipment during the planning and implementing periods. In order to make the periodic upgrade of training equipment possible, it is also important to secure budget for upgrade costs, and to facilitate income generation and seeking for support from outside by the implementing agency.

(3) Secure Long-term Effects by Taking Time to Enhance Lecturers' Capacity

After the commencement of project, it was found necessary to significantly upgrade the capacity of lecturers in the target university, especially that of lecturers who teach in the

programing field to develop the advanced level of IT human resources required by the private sector. Therefore, the project conducted intensive capacity-building of lecturers by providing instruction utilizing classes for two years, which was one year longer than the initial plan, and started the course in the 3rd year.

This decision resulted in lecturers being able to teach students in the last half of 3 years. However, at the time of ex-post evaluation it was identified that IT engineers were developed continuously in the course up to a level that meets the needs of the private sector.

The approach of the project for intensive capacity-building of lecturers can be regarded as important to secure long-term effectiveness. This approach can be a reference in cases to develop human resources to meet international standards in countries with a thin layer of IT human resources like Laos.

(4) Inclusion of Measures to Maintain Human Resources at School as a Part of Project Activities

In order to assure stable work for lecturers within the school, the project was planned to implement the short-term course besides the regular course, which enabled the lecturers to obtain supplementary income. The short-term course has been implemented as planned, and lecturers can obtain salary at the same level as IT engineers working in private companies. At the time of the ex-post evaluation, all lecturers who had worked in the project implementation period were still working. The level and instruction content of the course supported by the project has been maintained. The supplementary income from the short-term course became an incentive for lecturers to continue to work. The retention of lecturers who upgraded their capacity is crucial to maintain the effects produced by the project. Including measures for retention of lecturers as a part of project activity is one of the options.

End