

Lao People's Democratic Republic

FY2015 Ex-Post Evaluation of Japanese Grant Aid Project

“The Project for Expansion of Vientiane International Airport”

External Evaluator: Makiko Soma, Value Frontier Co., Ltd.

0. Summary

The project aims to improve the safety and security systems of the Vientiane International Airport and to meet the greater aviation demands expected in the future by expanding the facilities and upgrading the equipment at the airport, thereby contributing to promotion of tourism, improvements of logistics and investment climate to vitalize the economy of Lao People's Democratic Republic (Laos).

The project has been consistent with the development policies and development needs of Laos as well as the Japanese ODA policy toward Laos. Thus, its relevance is high. Both the project cost and period were within the plan. Therefore, efficiency of the project is high. Implementation of the project brought positive effects to Vientiane International Airport as expected. These effects include improved airport security in line with the standard imposed by International Civil Aviation Organization¹ (ICAO), advanced firefighting and rescue operations, and increased capacity to meet the growing demands of air transportation. In addition, some positive impacts such as enhancement of airport reliability, promotion of the air transportation industry and tourism, and improvement of investment climate have been observed. Therefore, effectiveness and impact of the project are high. No major problems have been observed in the institutional and financial aspects of the project. On the other hand, some minor problems are observed in terms of technical aspects of operation and maintenance. The staff of the implementing agency lacks technical skills and knowledge on operating and maintaining some of the provided equipment. They do not have a concrete plan to make improvements yet. Therefore, sustainability of the project effects is fair.

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

¹ ICAO was established as a UN specialized agency at the Convention on International Civil Aviation held in Chicago in 1944. ICAO's international standards and recommendations are summarized in the 18 annexes including rules of air, safety management, entry and departure at the airport, search and rescue, aerodrome, environmental protection, and aviation security. (Source: Website of Ministry of Foreign Affairs, accessed on May 8, 2016, <http://www.mofa.go.jp/mofaj/gaiko/icao/kankoku.html>)

1. Project Description



Project Location
(Source: Ministry of Foreign Affairs, Japan)



Taxiway Extended
(Vientiane International Airport)

1.1 Background

Laos is the only landlocked nation among the member countries of Association of South-East Asian Nations (ASEAN) and 80% of the land is mountainous. For Laos, air transportation is important for movement of passengers and cargos, connectivity with neighboring countries, promotion of international tourism, and acquisition of foreign currencies. Vientiane International Airport plays an important role as a gateway of the country and a hub of tourism and other economic activities.

The number of passengers at Vientiane International Airport was increasing by 9%² every year between 2000 and 2010. The existing airport facilities at the time of the project planning were not expected to be able to handle the growing aviation demands. The airport was not intended for large aircraft such as B747³. The airport needed to have a greater capacity to accommodate landings and departures of large aircraft to meet the growing demand. Also, Laos had an obligation to observe the standards set by ICAO as its member country. However, Vientiane International Airport did not fulfill some of the standards on aerodrome and airport security. Thus the airport received recommendations from ICAO to make improvements. Vientiane International Airport played important roles as a gateway in Laos and as a foothold for economic activities including logistics, tourism, and foreign diplomacy. Improving the airport safety and security standards, in addition to responding to the growing aviation demands, was necessary to maintain these important functions. Under such circumstances, Japanese government conducted a preparatory study of the project. Because the study identified that it was necessary to improve the Vientiane International Airport, Lao government requested the following assistance to Japanese government: expansion of parking apron⁴, construction of new taxiways, and improvement of various security equipment.

² JICA Documents

³ Large aircraft called Boeing 747-400.

⁴ The area of an airport where aircraft are parked, refueled, inspected and maintained. Also, passengers and crews board and exit, cargos are loaded and unloaded.

1.2 Project Outline

The Project aims to improve the safety and security systems of Vientiane International Airport and to meet the growing aviation demands expected in the future by expanding the facilities and upgrading the equipment at the airport, thereby contributing to promotion of tourism, improvements of logistics and investment climate to vitalize the economy of Laos.

<Grant Aid Project>

| | |
|---|---|
| E/N Grant Limit or G/A Grant Amount / Actual Grant Amount | 1,935 million Japanese Yen (JPY) / 1,935 million JPY |
| Exchange of Notes Date (/Grant Agreement Date) | August, 2011 / August, 2011 |
| Implementing Agency | Ministry of Public Works and Transport Department of Civil Aviation and Lao Airport Authorities |
| Project Completion Date | March, 2013 |
| Main Contractors | Hazama Ando Corporation (construction), Toyota Tsusho Corporation (security equipment), Sirius Corporation (Fire equipment) |
| Main Consultants | Nippon Koei Co., Ltd. / Azusa Sekkei Co., Ltd. (JV) |
| Basic Design | September 2010 to July 2011 |
| Related Projects | <ul style="list-style-type: none"> ● Japan International Cooperation Agency (JICA): Vientiane International Airport Terminal Expansion Project (January 2014 -) 9,017 million JPY (loan) ● JICA: The Project for Rehabilitation of Vientiane International Airport (1995-1998) 4,464 million JPY (grant aid) ● Asian Development Bank(ADB): Airports Improvement Project (1993-2001) 14.35 million USD (loan) ● Thai government: The Project for Pavement Improvement of Vientiane International Airport (2005-2006) about 9.6 million USD (30% grant, 70% loan) ● The Export-Import Bank of China: Wattay International Airport Upgrading Project (mainly military apron) (2011-2012) Amount unknown. |

2. Outline of the Evaluation Study

2.1 External Evaluator

Makiko Soma, Value Frontier, Co. Ltd.,

2.2 Duration of Evaluation Study

Duration of the Study: September 2015 to October 2016

Duration of the Field Study: January 17 to 29, 2016 and April 17 to 22, 2016

3. Results of the Evaluation (Overall Rating: A⁵)

3.1 Relevance (Rating: ③⁶)

3.1.1 Relevance to the Development Plan of Laos

Improvement of Vientiane International Airport was a priority of aviation sector in the “Sixth National Socio-Economic Development Plan (2006-2010)” of the government of Laos at the time of the project planning. The airport improvement remained to be important in the public works and transportation sectors of the “Seventh National Socio-Economic Development Plan (2011-2015)” in order to fulfill the demands for aviation in Laos, the Great Mekong Subregion and the ASEAN member states at the time of the ex-post evaluation.

The policy of aviation sector, the “Civil Aviation Master Plan (2004-2013) (CAMP),” suggested the following at the time of the project planning: 1) improvements of taxiways and runways, 2) improvement of apron, 3) upgrading of firefighting and rescue equipment, and 4) expansion of passengers’ terminals and other functions. On the other hand, the policy on aviation security, the “National Civil Aviation Security Program First Edition-2009 (Civil Aviation Security Program)”, aimed to standardize and improve the airport security screening. The “Strategic Civil Aviation Plan (2012-2020)” continues to emphasize the importance of the above four issues suggested in the CAMP at the time of the ex-post evaluation. The Strategic Civil Aviation Plan has been amended several times since 2012. It was in the process of being approved by the Ministry of Public Works and Transport (MPWT). The Department of Civil Aviation (DCA) still uses the Strategic Civil Aviation Plan as an important plan in the civil aviation sector. Regarding the Civil Aviation Security Program, DCA updates it whenever the ICAO standards are revised so as to further strengthen the security system.

As seen above, improvements of the airport facilities, safety, and security were priority issues in the development plan and aviation sector plans of Laos both at times of the project planning and the ex-post evaluation. Therefore, the project was consistent with the national development policies and aviation sector policies of Laos.

3.1.2 Relevance to the Development Needs of Laos

Vientiane International Airport did not fulfill the ICAO standards on aerodrome or aviation security at the project planning. This was because the parking apron did not have sufficient capacity and because the security equipment such as X-ray machines as well as the firefighting

⁵ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁶ ③: High, ②: Fair, ①: Low

equipment were insufficient, malfunctioning, and too old. There were eight bays in the apron at the time of the project planning but the expansion was needed to meet the increasing aviation demand. It was forecasted⁷ that 14 bays would be needed by 2018, and 21 bays by 2023. Lack of capacity of the parking apron significantly limited operations of regular flights of small and medium sized aircraft when large aircraft used the airport. In some cases, boarding of some domestic irregular flights had to be done at the military apron adjacent to the Vientiane International Airport. The fire vehicles needed to be renewed in order to carry out adequate firefighting and rescue activities because the existing fire vehicles and equipment had passed their service lives. Furthermore, Among the ASEAN member states, Laos was one of the few countries where Explosive Testing Device (ETD) had not been deployed. In order to avoid the risks of international terrorism and infiltration of hijack criminals, ETD was needed.

According to DCA, the number of international passengers of Vientiane International Airport increased by 1.5 times from 0.62 million to 0.95 million between 2011 and 2015 while the number of tourists increased by 1.7 times from 2.51 million to 4.33 million between 2010 and 2015. These figures clearly show the increase of aviation demands. From the time of the project planning until the ex-post evaluation, ICAO required DCA to constantly review the safety and security systems in line with the latest ICAO standards and recommendations⁸ in order to respond to emerging risks and threats.

As seen above, it has been increasingly necessary to respond to greater aviation demands and to improve safety and security systems of the airport. Therefore, the project has been highly consistent with the development needs of Laos from the project planning until the ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policy

The basic policy of the "Japan's Country Assistance Policy for Laos (2006)" was "to support self-help efforts of Laos for the reduction of poverty and for human development, and to support such efforts by Laos for realizing voluntary, independent, and sustainable economic growth, with a view to integration into global and regional economies." Under this basic policy, infrastructure development in Vientiane, the capital city and a center for economy, was particularly important as one of the assistance objectives. Airport improvement was part of the priority areas, "developing socioeconomic infrastructure and effectively utilizing existing infrastructure," under the above-mentioned basic policy and assistance objective. Therefore, the project was consistent with Japanese assistance policy at the time of the project planning.

⁷ JICA Documents.

⁸ DCA intensified their regulations on safety of airport facilities in response to the recommendations made during the regular inspection by ICAO Coordinated Validation Mission in April 2015.

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

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

The outputs were produced as planned. Table 1 to 3 show the details.

Table 1 Outline of Facilities

| Facility | Details of the Structure | Description |
|--|--|---|
| New west side apron | Concrete Pavement Area=78,000 m ² (600 m ×130 m) | Slab thickness (t) =36cm Base ⁹ t=36cm |
| Widening of existing apron | Concrete Pavement Area =7,000 m ² | |
| New east side apron | Concrete Pavement Area =7,000 m ² | |
| New taxiway ¹⁰ H | Asphalt Pavement Area=6,000 m ² Length (L) = 105 m | Surface and base courses ¹¹ =13cm, Base t=107cm |
| Widening of taxiway F&G | Asphalt Pavement Area=2,000 m ² | Surface and base courses =13cm, Base t=107cm |
| New taxiway and apron shoulder | Asphalt Pavement Area=18,000 m ² | Surface ¹² t=8cm, Base t=49cm |
| New GSE (Ground Support Equipment) Road | Width (W)=10 m, L =600 m | Slab t=20cm Base t=36cm |
| | Concrete Pavement Area=6,000 m ² | |
| | W=10m, L=600m Asphalt Pavement Area=6,000 m ² | Surface =10cm, Base t=52cm |
| Widening of east side of existing GSE road | W=10m, Asphalt Pavement Area = 2,000 m ² | Surface =10cm, Base t=52cm |
| Drainage facilities | Under G Taxiway L = 42 m | Box culvert ¹³ 1.2 m×0.6 m: 1 box |
| | Under F Taxiway L = 95 m | Box culvert 1.5 m×0.4 m: 2 boxes |
| | Under road L for crossing of firetrucks =12m | Box culvert 1.2 m×0.9 m: 3boxes |
| | Under new H Taxiway L = 95 m | Box culvert 1.2 m×0.9m: 3 boxes |
| | Under newly expanded apron L = 36 m | Box culvert 1.2 m×0.9 m: 1 box |
| | U-ditch for GSE L = 636 m | Width 0.6 m, Depth 0.4 m, 0.7 m, 0.9 m |

Source: JICA Documents

⁹ Thickness of roadbed (foundation of the pavement such as concrete and asphalt).

¹⁰ A path for aircraft at an airport connecting runways and other facilities.

¹¹ Asphalt pavement (surface and foundation).

¹² Top layer of asphalt pavement.

¹³ A box-shape structure that allows water to flow under the soil.

Table 2 Security Equipment

| Equipment | Usage | Qty. |
|--------------------------------------|--|------|
| X-ray Machine | X-ray inspection of passengers, luggage (check-in and carry-in) of passengers, and cargo | 5 |
| Computer Based Training System (CBT) | Final examination for security staff at the training center | 1 |
| Metal Detector | Screening luggage of the international transit passengers | 2 |
| ETD | Inspection of explosives and hazardous chemicals around international check-in counters | 1 |

Source: JICA Documents

Table 3 Fire Equipment

| Equipment | Usage | Qty. |
|---|--|------|
| Airport Rescue and Fire Fighting (ARFF) Vehicle | Fire extinguishing operations at airport accidents | 3 |
| Rescue Equipment | Rescue operations at airport accidents | 1 |
| Rescue Vehicle | Rescue operations at airport accidents | 1 |

Source: JICA Documents

Table 4 shows the activities planned under the Lao side cost. All were carried out as planned except the construction of an additional parking garage at the fire station.

Table 4 The Lao Side Cost

| Activities | Planned Cost (Million Kip) ¹⁴ (2010) | Actual (2015) |
|---|---|----------------------------|
| 1. Relocation of meteorological farm | 129.3 | Completed (Amount unknown) |
| 2. Relocation of some facilities in the apron | 12.9 | Completed (Amount unknown) |
| 3. Construction of a new shelter | 49.4 | Completed (Amount unknown) |
| 4. Dismantling and set-up of an existing shelter | 9.9 | Completed (Amount unknown) |
| 5. Rescue equipment (first aid kit) | 21.9 | Completed (Amount unknown) |
| 6. Equipment for rescue vehicle | 87.8 | Completed (Amount unknown) |
| 7. Construction of an additional parking garage at the fire station | 480.8 | Not implemented |
| 8. Bank fees | 100.9 | Completed (Amount unknown) |
| Total | 892.9 | Amount Unknown |

Source: JICA Documents and Answers to the Questionnaire by DCA

¹⁴ Exchange rate: 1 Kip = 0.0104 yen (as of May 2011). Source: JICA Documents.

Among the activities planned under the Lao side cost, “7. Construction of an additional parking garage at the fire station” was not implemented. The three units of ARFF and one unit of rescue vehicle procured in the project are parked inside the existing garage. However, the four old firetrucks are parked outside because the garage is full. Construction of the additional parking garage was not implemented although the project finished two months earlier than planned. This was because the budget for garage construction was not approved at MPWT despite the request from LAA. As a result, the project finished without implementing this activity that accounted for 54% of the Lao side cost. Absence of this activity, however, was not likely to significantly degrade the efficiency of the project because it was only less than 0.5% of the total project cost. At the time of the ex-post evaluation, LAA prepared a technical drawing for construction of an additional garage to be submitted to MPWT for budget allocation in 2017.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned project cost was 1,944 million JPY (1,935 million JPY was to be provided by Japanese Grant Aid and 9 million JPY was to be provided by the Lao side cost). The actual project cost provided by Japanese Grant Aid was 1,684 million JPY, which was 87% of the plan. The actual project amount by Lao side is unknown.

3.2.2.2 Project Period

The planned project period was 22 months from August 2011 to May 2013. The actual project period was 19.4 months from August 3, 2011 to March 15, 2013, which was 88% of the plan. DCA was able to shorten the project period because they prioritized the construction of airport infrastructure facilities over other tasks to finish it before the Asian-Europe Meeting (ASEM) that was held in November 2012. DCA also cut the time required for administrative procedures.

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

3.3 Effectiveness¹⁵ (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

The objective of the project was to improve the safety and security systems of Vientiane International Airport and to meet the growing aviation demands. The quantitative indicators 1 to 7¹⁶ and their achievements are shown in Table 5 and 6. For Indicator 2, it seemed that the

¹⁵ Sub-rating for Effectiveness is to be put with consideration of Impact.

¹⁶ The indicators 1 to 4 were set at the project planning while 5, 6, and 7 were added by the external evaluator.

baseline and target figures were erroneously set at the time of the project planning. Therefore, the external evaluator revised these figures with the consent of DCA. At the time of the project planning, the number of domestic passengers (the sum of departure and arrival) in 2010 was found to be 354,000. According to DCA, however, this figure might have included the passengers at other domestic airports in Laos. The correct number of domestic passengers at Vientiane International Airport should be 161,000. With this revision of the baseline, the target figure was revised accordingly. The data at the time of project planning identified the growth rate of the number of domestic passengers between 2010 and 2016 to be 1.41. This is because the expected target in 2016 was 502,000 while the baseline in 2010 was 354,000 ($502,000 / 354,000 = 1.41$). Using 1.41 as a coefficient, the new target was calculated to be 227,000.

Table 5 Quantitative Indicators (Data at Vientiane International Airport)
Target Achievement Ratios (%) are shown in the parenthesis

| Indicators | | Baseline at Ex-ante Evaluation (2010) | Target 3 Years After Completion (2016) | 2013 (Actual) Completion Year | 2014 (Actual) 1 Year After Completion | 2015 (Actual) 2 Years After Completion | 2016 (Estimate) (Note 1) 3 Years After Completion |
|------------|--|---------------------------------------|--|-------------------------------|---------------------------------------|--|---|
| 1 | Number of international flight passengers | 608,000 | 1,019,000 | 559,000 | 748,000 | 1,020,000 (100%) | 1,053,000 (103%) |
| 2 | Number of domestic flight passengers | 161,000 (Note 2) | 227,000 (Note 3) | 203,000 | 304,000 | 370,000 (162%) | 382,000 (168%) |
| 3 | Ratio of transit passengers inspected for security (%) | 0 | 100 | 100 | 100 | 100 (100%) | 100 (100%) |
| 4 | Ratio of random inspection with ETD on baggage (%) | 0 | 2 (Note 4) | 2 | 2 | 2 (100%) | 2 (100%) |
| 5 | (Additional Indicator) Frequency of accidents in runway and taxiways in a year | Unknown | None | 0 | 0 | 1 | 0 |
| 6 | (Additional Indicator) Number of times military area was used by civilian aircraft in a year | Unknown | None | 0 | 0 | 0 | 0 |

Sources: JICA Documents and Answers to the Questionnaire by DCA

Note 1: DCA estimated the 2016 data using the regression line based on the increase rate between 2010 and 2015.

Note 2: The target set at the time of the project planning was 354,000.

Note 3: The target was reset because the baseline was revised as indicated in Note 2. To do this, the rate of increase (141%) that was assumed at the time of the project planning was used.

Note 4: To set the target, the ratio of random inspection in Cambodia at the time of the project planning was applied.

Indicator 5 was set to verify the safety of the aircraft operation. Indicator 6 was set to make sure that there was no use of military apron by civilian aircraft at the time of the ex-post evaluation because this problem was mentioned in the section 3.1.2 Relevance to the Development Needs of Laos. Indicator 7 was set because landing and departing of large aircraft was limited at the time of the project planning. This was an important factor to justify the necessity of expanding apron.

Table 6 Indicator 7 (Additional Indicator) Number of Large Aircraft Accommodated

| Before Project (Before 2010) | Project Completion (After 2013) |
|------------------------------|---------------------------------|
| 7 | 15 |

Source: Answers to the Questionnaire by DCA

At the time of the project planning, the target year was set at 2016. But this ex-post evaluation study was conducted in 2015, thus, the data in 2015 were used to verify the project's achievements. As shown in Table 5, Indicator 1 (number of international flight passengers) achieved the target by 100%. Indicator 2 (number of domestic flight passengers) achieved 370,000 against the revised target of 227,000, exceeding the target by 62%. Indicator 3 (ratio of transit passengers being inspected for security) and Indicator 4 (ratio of random inspection with ETD on baggage) both achieved their targets by 100%.

Indicators 5, 6, and 7 were added by the external evaluator, thus there was no baseline or target for these indicators. For Indicators 5 and 6, the evaluation focused on annual changes from 2013 to 2015. For Indicator 7, the data was compared before and after the project. About Indicator 5, there was a minor accident where aircraft of Lao Skyway, a domestic airline, skid off the runway and caused a minor damage on the body of the aircraft due to pilot error. It was a minor accident and there were no injuries. About Indicator 6, the military area was not used by civilian aircraft. As for Indicator 7, Table 6 compares the numbers of large aircraft that can be accommodated at Vientiane International Airport before and after the project. They increased greatly from 7 in 2010, before the project, to 15 in 2013, after the project.

3.3.2 Qualitative Effects

The qualitative effects expected in the project were largely achieved as follows.

(1) Improvement of Airport Security against Illegal Acts

Lao-Japan Airport Terminal Services Co., Ltd. (L-JATS)¹⁷ is in charge of operation and maintenance of the security equipment deployed by the project in the international terminal of Vientiane International Airport. According to the L-JATS staff interviewed, they were able to find very small bullets or packets of illegal drugs that were impossible to find before the project. They thought that it was because of the greater number of security equipment with better precision. They also thought that introduction of ETD strengthened the measures against international terrorism and invasion of hijackers.

¹⁷ A joint venture between Laos and Japan to conduct ground-handling and operations of international passenger terminal at Vientiane International Airport.

(2) Strengthening Emergency Measures against Aircraft Accidents

In the project, three units of ARFF and one unit of rescue vehicle were procured and the requirements of ICAO category 9¹⁸ was fulfilled. Vientiane International Airport fell under category 7 before the project. Therefore, firefighting and rescue operations of the airport became two levels higher than before.

(3) Airport Operations with International Standard

The airport operations were improved after the project through satisfaction of ICAO category 9 requirements in firefighting operations, introduction of ETD, and deployment of more advanced security equipment. All of the 35 security inspectors interviewed during the beneficiary survey¹⁹ answered that the security level of Vientiane International Airport was improved after the project as compared with before the project. Ninety percent (31 out of 35) of the respondents answered that the quality of security screening at the airport met the international standard after the project. For this answer, 22 out of the 31 respondents explained the reason as “improvement of precision of the security equipment.” Others mentioned “decreased claims from the passengers’ arrival airports” (6 respondents) after the project. Before the project, Vientiane International Airport used to receive many claims from the passengers’ arrival airports in countries such as Thailand and Viet Nam, blaming an inadequate security screening in Vientiane.

(4) Eliminating Restraining Factors of Processing Performance of the Airport

The project expanded the parking apron and taxiways to more than twice the original areas. The capacity of parking apron also increased by more than two-fold. Therefore, Vientiane International Airport can accommodate a greater number of aircraft. The aircraft are also able to keep wider distance with each other compared to before. At the international terminal, there was only one lane for the security screening due to limited number of security equipment before the project. L-JATS can provide two lanes for screening departing passengers after the project because they have more security equipment. There was a significant increase in the number of international flights compared to before. Thus, it appears that the project certainly contributed to improving the processing ability of the airport by increasing the number of security equipment.

¹⁸ ICAO defines 11 airport categories according to fuel and passenger capacities of aircraft in service. Each category requires airports’ firefighting equipment to have specific capacities of foam load and water emission. The greater number requires higher firefighting capability.

¹⁹ Personal interviews were conducted to 35 security screeners (20 males, 15 females, with response rate of 100%) at international terminal of Vientiane International Airport from January 19 to 25, 2016. This was to survey the status of improvements of airport security and airport processing ability. More than 90% of both male and female respondents answered positively to the questions on the improvements of quality of security screening, security, and safety. Therefore, there was no significant difference between the answers of males and females.

(5) Improving Convenience of Participating Countries to the International Conferences

Vientiane International Airport was able to prepare 15 parking spots for large aircraft at the ASEM in 2012. The ASEAN Summit will be held in Vientiane in September 2016 and more than 10 units of large aircraft are expected to land. DCA thinks that hosting of these international conferences would be much more difficult if the project did not expand the apron and taxiways. Improvement of the security and firefighting equipment also greatly helped the airport to be well prepared for accepting the participants. The above indicates that the project has enhanced convenience of the participating countries to international conferences.

3.4 Impacts

3.4.1 Intended Impacts

The project was expected to have several impacts: 1) improvement of reliability of the airport functions, 2) promotions of the air transport industry, 3) promotion of tourism, and 4) improvement of investment climate. The achievement status of these impacts at the time of the ex-post evaluation are as follows.

(1) Improvement of Reliability of the Airport Functions

In the beneficiary survey²⁰, 72 out of 80 passengers (90%) interviewed at the international terminal answered that the security screening at Vientiane International Airport was adequate for an international airport because of several reasons. For example, five respondents said that they did not feel so much difference with the security screening at other airports in Europe or Thailand. Four people said that there was an adequate security equipment. Also, the qualitative effects 1) to 5) described under “3.3.2 Qualitative Effects” were confirmed. Therefore, the project was evaluated to have contributed to improving the airport reliability to a certain extent.

(2) Promotions of the Air Transport Industry

The transaction volume of international air cargos at Vientiane International Airport was increasing from before the project to the time of the ex-post evaluation as shown in Table 7.

Table 7 Annual Transaction Volume of International Air Cargo at Vientiane International Airport

| Unit: tons | | | | | |
|------------|-------|-------|-------|-------|-------|
| 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| 1,692 | 1,882 | 2,008 | 2,939 | 2,698 | 3,034 |

Sources: JICA Documents and Data Provided by L-JATS

²⁰ The beneficiary survey was implemented at the waiting space of the international terminal of Vientiane International Airport from January 19 to 25, 2016. Personal interviews were conducted to 80 passengers (45 males, 35 females, with response rate of 100%. It should be noted that the survey avoided the members of Asian tour groups because many of them had difficulty in understanding the survey questions in English and Lao). The survey asked the passengers of international flights about their satisfaction in terms of comfortableness, quality of security screening, time required for check-in etc. There was no significant difference in the answers between male and female because more than 80% of both male and female respondents answered positively to these questions.

The project met the growing demands of not only passengers but also air cargos by expanding parking aprons and taxiways. In addition, the project upgraded an old X-ray machine for cargos to enable more precise cargo screening. In sum, the project seems to have contributed to promoting the air transport industry.

(3) Promotion of Tourism

The number of tourists in Laos was 2.51 million in 2010 and increased by 1.7-fold to 4.33 million in 2015. This increase of tourists implies that tourism has been promoted. The number of tourists going through only Vientiane International Airport was not known. Thus, it was difficult to objectively analyze how the project contributed to the tourist increase and to tourism promotion. Nonetheless, the project likely contributed to increasing the airport's capacity to accept the growing number of tourists by improving the largest airport in Laos.

Table 8 Tourists in Laos

Unit: Number of tourists in thousand

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Number of Tourists | 2,513 | 2,724 | 3,330 | 3,779 | 4,159 | 4,332 |

Source: Answers to the Questionnaire by DCA

(4) Improvement of Investment Climate

Table 9 shows the steady rise in the direct inward investment in Laos during the five years between 2010 and 2014. Through the implementation of the project, Vientiane International Airport was able to respond to the increased passengers and greater demands for air cargo transactions. The above suggests that the project has supported to build the investment climate of Laos.

Table 9 Direct Inward Investment

Unit: 100 Million USD

| 2010 | 2011 | 2012 | 2013 | 2014 |
|-------------|-------------|-------------|-------------|-------------|
| 14.2 | 16.2 | 14-16 | 27.0 | 31.6 |

Source: Reports from Japan External Trade Organization (2011-2015)

3.4.2 Other Impacts

(1) Impacts on the Natural Environment

The project was not required to conduct Environmental Impact Assessment (EIA) or Initial Environmental Evaluation (IEE) for expansion of the parking apron. DCA was monitoring the disposal of wastewater. There was no reported problem of water pollution with chemicals or hazardous substances during the construction. There was no reported problem of noise. DCA checks the noise level in accordance with the ICAO standard by requiring airlines to submit the results of noise screening for all aircraft.

(2) Land Acquisition and Resettlement

The project took place inside of the terminal building and airport compound. There was no resettlement or land acquisition in the project.

As seen above, the project improved the airport security and established firefighting and rescue system in accordance with the ICAO standards at Vientiane International Airport. The project also enabled the airport to meet the growing aviation demands. In short, it is judged that the project produced the expected effects as planned. In addition, several impacts, such as improvement of reliability of the airport functions, promotions of the air transport industry and tourism, and improvement of investment climate, were confirmed as mentioned above. There was no negative impact reported with regard to natural environment or resettlement.

In light of the above the project has largely 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

The institutional arrangement of operation and maintenance both at times of the project planning and the ex-post evaluation is described in Figure 1. There was no change in the arrangement before and after the project.

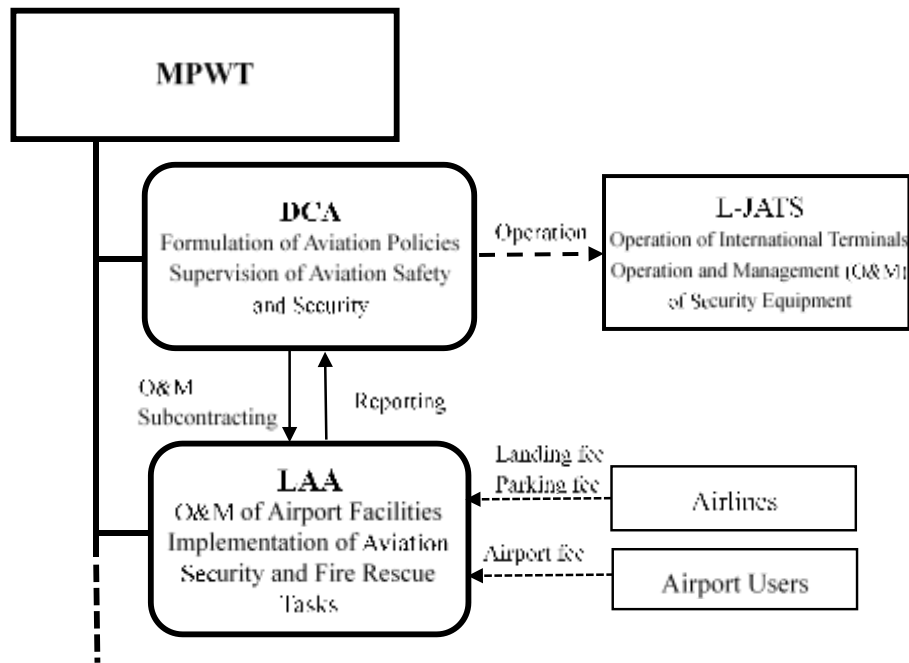


Figure 1 Operation and Maintenance Structure of the Facilities Constructed and Equipment Deployed by the Project

Source: Prepared by the Author based on Interviews with Implementing Agencies

There was no change in the actors who are in charge of operations and maintenance of the facilities and equipment.

- ✓ Airport infrastructure facilities (apron, taxiway, and GSE road): LAA assigns twelve staffs to take care of the daily maintenance. LAA outsources the annual maintenance to a private company. DCA is in charge of large scale maintenance to be conducted every 9 and 15 years. LAA and DCA have sufficient manpower to take care of the above tasks.
- ✓ Security equipment (X-ray machine at international terminal, metal detector, ETD): L-JATS is in charge of operation and maintenance. L-JATS outsources their triannual maintenance and inspection to a distributor in Laos. L-JATS does not encounter shortage of manpower in these tasks.
- ✓ Security equipment (X-ray machine at domestic terminal): LAA is in charge of the operation and maintenance. The project replaced an old X-ray machine for cargo with a new one. There is no shortage in manpower because the operators of the old machine took over the operation and maintenance of the new machine.
- ✓ Firefighting equipment (ARFF, rescue vehicle etc.): LAA is in charge of operation and maintenance. There is no shortage in manpower because the operators of the old vehicles took over the operation and maintenance of the new ones. The old vehicles are maintained as backup.

- ✓ CBT: CBT was installed in the training center of DCA. Operation and maintenance is done by DCA with sufficient manpower.

As seen above, with regard to operation and maintenance, there was no change in the assigned responsibility and decision making processes in the organizations from the time of the project planning to that of the ex-post evaluation. DCA, LAA and L-JATS clearly understand their responsibilities and have sufficient manpower for the operation and maintenance of the facilities and equipment.

Therefore, there is no problem in the institutional aspects of operation and maintenance.

3.5.2. Technical Aspects of Operation and Maintenance

When the security and firefighting equipment were delivered, the supplier provided trainings on the operation and maintenance. The situation and issues of technical aspects in operation and maintenance of each facility and equipment at the time of the ex-post evaluation are as follows:

- ✓ Airport infrastructure facility (LAA): There is no technical issue because the maintenance work does not require high skills. Annual maintenance is outsourced.
- ✓ X-ray machine at the International terminal, metal detector, and ETD (L-JATS): L-JATS does not have a technical problem because they outsource the tasks to a company specialized in maintenance.
- ✓ X-ray machine for cargo (LAA): There is no technical issue because it was a replacement of an old X-ray machine to a new one.
- ✓ Firefighting equipment (LAA): LAA fire staff have sufficient knowledge and skills of fire extinguishing using the new firefighting equipment. However, they feel that operation and maintenance of the electrical system of the ARFF is too difficult for them because they think it is more complex than the old one. They also have hard time understanding the English manual of the ARFF. Even though there are no serious issues yet, there are minor problems such as slow operation of the monitor screens and directional signals. LAA has not fixed these problems yet. They are considered as minor problems because they do not affect the vehicles' functions such as driving and fire extinguishing. But they should still be fixed. The supplier conducted training at delivery but the LAA fire staff were uncertain if they were able to entirely understand the training contents because it was conducted in English. During the training, an LAA staff had to serve as a translator although he was not fully confident with his English ability. LAA is planning to request for a budget for 2017 to conduct On the Job Training (OJT) to MPWT. There are no technical issues for other equipment except ARFF because they do not require advanced knowledge and skills in operation and maintenance.
- ✓ CBT (DCA): There is no technical problem in maintaining CBT.

Some minor problems have been observed in the operation and maintenance of the electrical system of ARFF. LAA fire staff should undergo trainings to enhance their understanding and to improve the operation and maintenance skills of ARFF. In short, there is no problem in the technical aspects of operation and maintenance except for ARFF.

3.5.3. Financial Aspects of Operation and Maintenance

(1) Financial Status of LAA and Operation and Maintenance of the Facility and Equipment

Financial status of LAA who is in charge of operation and maintenance of the airport infrastructure facilities and security equipment is shown below. LAA's revenue has increased along with the increased numbers of flights and passengers. Budget allocation is also sufficient. Thus, there is no problem in their financial status.

Table 10 Financial Status of LAA

Unit: Million Kip

| | 2011 Actual | 2012 Actual | 2013 Actual | 2014 Actual | 2015 Actual | 2016 Estimate |
|-----------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|--------------------------|
| Total Revenues | 27,107 | 30,119 | 35,434 | 47,613 | 61,343 | 97,756 |
| Total Expenditures | 25,048 | 38,854 | 30,505 | 32,706 | 53,286 | 64,828 |
| General administrative cost | 6,790 | 20,301 | 18,982 | 19,110 | 29,798 | 31,164 |
| Maintenance cost | 4,593 | 8,883 | 5,264 | 4,297 | 9,868 | 18,514 |
| Others | 13,645 | 9,670 | 6,259 | 9,299 | 14,620 | 15,150 |

Source: Answers to the Questionnaire by LAA

In 2014 and 2016, LAA increased their revenues greatly from the previous years. This is because LAA sharply increased the charges from airlines in 2013 and 2015. The maintenance expenditures of 2012, 2015, and 2016 (estimate) are larger than other years because large-scale maintenance was (is being) carried out in preparation for international conferences in Vientiane; ASEM held in November 2012 and ASEAN Summit to be held in September 2016. In addition to three ARFFs and one rescue vehicle procured by the project, LAA has three old fire vehicles as backup. In total, LAA is operating and maintaining seven units of fire vehicles at Vientiane International Airport. The cost of operation and maintenance are shown in Table 11. Expenditure for spare-parts increased in 2015 because both old and new fire vehicles underwent large-scale maintenance.

Table 11 Maintenance Cost of Fire vehicles

Unit: Million Kip

| | 2013 (Actual) | 2014 (Actual) | 2015 (Actual) |
|-----------------------|----------------------|----------------------|----------------------|
| Personnel Cost | 385 | 363 | 380 |
| Fuel, engine oil etc. | 285 | 285 | 278 |
| Spare-parts | 24 | 19 | 189 |

Source: Answers to the Questionnaire by LAA

(2) Operation and Maintenance of Security Equipment by L-JATS

With the increased units of security equipment (five X-ray machines, two metal detectors and one ETD) at the international terminal, the maintenance expense of L-JATS also increased. Meanwhile, Table 12 shows that their revenues including ground-handling charges²¹, a main source of revenue, also increased. L-JATS increased their budget allotment for maintenance of all of their security equipment. Therefore, there should be enough fund to cover the maintenance cost of the equipment procured by the project.

Table 12 Financial Status of L-JATS

Unit: Million Kip

| | 2009 | 2012 | 2013 | 2014 | 2015 |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|
| Total Revenues | 39,547 | 60,159 | 65,372 | 64,640 | 74,191 |
| Ground-handling charges | 24,513 | 38,510 | 41,915 | 39,634 | 44,912 |
| Total Expenditures | 24,372 | 34,511 | 36,687 | 41,159 | 50,897 |
| Maintenance of security equipment | No data | 19 | 25 | 34 | 34 |

Source: L-JATS Documents

(3) Operation and Management of CBT by DCA

DCA does not allocate specific budget for operation and maintenance of CBT. This is because their ordinary maintenance budget is sufficient to cover this expense. The software license expired in March 2016. As of April 2016, DCA was trying to obtain the quotation to renew the license as soon as possible.

In sum, LAA and L-JATS do not have particular problems in their financial statuses. DCA maintains CBT using their ordinary maintenance budget without any problem. Therefore, there is no problem in financial aspects of operation and maintenance.

²¹ Fees paid by airlines to L-JATS for ground handling operations.

3.5.4. Current Status of Operation and Maintenance

The status of operation and maintenance of the airport infrastructure facilities and equipment at the time of the ex-post evaluation is as follows:

- ✓ Apron / Taxiway (LAA): LAA's inspection record shows that there are 22 linear cracks²² on the taxiways and numerous (uncountable) cracks in the area with 1500 m² on the apron shoulder. They were found after JICA's defect inspection in 2013. They have not yet fixed these cracks. LAA thinks these are minor cracks that did not reach the layer lower than asphalt. However, in order to prevent rainwater penetration, they should take care of the problem as soon as possible. LAA plans to repair the cracks using the budget allocated for the preparation of ASEAN Summit to be held in September 2016.
- ✓ Security Equipment (L-JATS and LAA): L-JATS and LAA operate and maintain five X-ray machines and two metal detectors in good conditions. ETD has a malfunction since December 2015. L-JATS contacted a distributor to obtain a quotation for repair.
- ✓ Firefighting Equipment (LAA): Two out of three units of ARFF have electrical problems such as slow starting of the monitor screens and directional signals and sensor malfunction. The fire staff and technicians do not have adequate knowledge on electrical system to fix these problems. They also have difficulty understanding the manuals written in English. These problems pose obstacles for LAA to fix the problems. LAA have repeatedly contacted the manufacturer in Italy, however, they have lost touch after the warranty period expired. These problems remain unfixed because LAA cannot find a person who can do the repair in Laos. Although these problems are considered minor and do not affect the driving and fire extinguishing functions as a fire vehicle, LAA should make a clear repair plan. There is no problem in maintenance of their rescue vehicle and rescue equipment.
- ✓ CBT (DCA): The software stopped working since September 2015 due to some problems of network system. Although this problem was fixed in February 2016, the software expired in March 2016. DCA is trying to obtain a quotation to renew the license at the earliest possible time before the end of 2016.

As above, there are, by and large, no particular problems in operation and maintenance of the airport infrastructure facilities and equipment except ARFF at the time of the ex-post evaluation. There are already clear plans for repairing the cracks on the taxiway, malfunctions of ETD, and the software of CBT. However, LAA still has to plan for the repair of the electrical systems of the two units of ARFF. Therefore, current status of operation and maintenance is concluded to have minor problems.

²² Cracking of a layer of asphalt pavement.

In summary, no major problems have been observed in the institutional, technical and financial aspects of the operation and maintenance system. However, some minor problems have been observed in terms of technical aspects and the status of operation and maintenance of ARFF. Therefore, sustainability of the project effects is fair.



CBT installed at DCA's training center



Fire vehicles:
One rescue vehicle (left) and three ARFFs

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project aims to improve the safety and security systems of the Vientiane International Airport and to meet the greater aviation demands expected in the future by expanding the facilities and upgrading the equipment at the airport, thereby contributing to promotion of tourism, improvements of logistics and investment climate to vitalize the economy of Laos.

The project has been consistent with the development policies and development needs of Laos as well as Japanese ODA policy toward Laos. Thus, its relevance is high. Both the project cost and period were within the plan. Therefore, efficiency of the project is high. Implementation of the project brought positive effects to Vientiane International Airport as expected. These effects include improved airport security along the standard imposed by ICAO, advanced firefighting and rescue operations, and increased capacity to meet the growing demands of air transportation. In addition, some positive impacts such as enhancement of airport reliability, promotion of the air transportation industry and tourism, and improvement of investment climate have been observed. Therefore, effectiveness and impact of the project are high. No major problems have been observed in the institutional and financial aspects of the project. On the other hand, some minor problems are observed in terms of technical aspects of operation and maintenance. The staff of the implementing agency lacks technical skills and knowledge on operating and maintaining some of the provided equipment. They do not have a concrete plan to make improvements yet. 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 Implementing Agencies

- ✓ There were several fire vehicles parked outside of the parking garage. This is because there were not enough garages, which Lao side was planned to construct under the project plan. LAA should request MWPT a budget for constructing an additional parking garage.
- ✓ LAA should make a budget request to MWPT to conduct OJT on operation and maintenance of the ARFF.
- ✓ DCA should renew the CBT software license as soon as possible.
- ✓ DCA should monitor L-JATS to confirm a prompt repair of the ETD.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Process of Equipment Selection when the Owner and the Operator Are Different

DCA and LAA might not have had sufficient discussion when selecting the ARFF procured in the project. It belongs to DCA while operation and maintenance are done by LAA. According to DCA, they heard the opinions of LAA. However, LAA staff thought that their opinions were not well reflected on the actual selection. LAA staff pointed out the following two obstacles in maintaining the ARFF. Both of them could have been avoided if they had had enough mutual discussion.

First, LAA staff thought that the electrical systems of the ARFF were too difficult and complicated for the knowledge and technical level of the LAA staff. Second, they could not obtain the spare-parts in the countries within ASEAN. It is costly and time consuming to order the spare-parts from Europe.

If DCA and LAA had had sufficient discussion over the specifications of ARFF including the electrical system, they could have chosen the ARFF with the specifications suitable to the technical capability of LAA. Even if it was difficult to change the specifications, DCA and LAA could have come up with possible solutions if they had discussed well. For example, they could have requested to the Japan side or the Lao side for budget or resources to obtain the manuals written in Lao or conduct trainings to capacitate the fire staff of LAA. Also, they could choose the ARFF whose spare-parts were available in neighboring countries such as ASEAN given that there was a careful discussion at the equipment selection stage.

In short, if the owner and the operator of the equipment belong to different organizations, they should closely collaborate to have sufficient discussion to mutually agree on the specifications. They should carefully compare the advantages and disadvantages of each candidate equipment.

The engaged consultants should make sure that the mutual consensus is built between the two organizations through the above selection processes.