Internal Ex-Post Evaluation for Technical Cooperation Project

conducted by Nepal Office: July, 2023

Country Name	**The Project for the Development of a Spare Parts Management Center and En-route Radar Control Services**
Nepal	

I. Project Outline

Background	Tribhuvan International Airport (TIA) in Kathmandu, the capital city of Nepal, was the country's only international airport, which also played an important role as a hub for domestic flights. In the past, when a malfunction had occurred in the aviation safety facilities, it had taken a long time to procure spare parts, and during that time, the aviation safety facilities had not been able to be used. To address this issue, the Government of Nepal (GON) was planning to establish Spare Parts Management Center at TIA to centrally manage the spare parts for the aviation safety facilities located throughout the country and, therefore, requested a technical cooperation project to the Government of Japan, which had experience in operating similar facilities. In addition, GON requested technical cooperation for en-route radar control services (ERCS)[1] to be newly introduced through the JICA's grant aid "TIA Modernization Project" (G/A in March 2013) being implemented for development of en-route radar etc.		
Objectives of the Project	Through establishing Spare Parts Management System (SPMS)[2] and providing ERCS, the project aims to upgrade safety and reliability of air traffic control services in Nepal, thereby improving safety of air transport. 1. Overall Goal: Safety of air transport is improved. 2. Project Purpose: Safety and reliability of air traffic control services is upgraded.		
Activities of the Project	1. Project site: The whole country of Nepal. 2. Main activities: (i) Preparation of database for air navigation system, introduction of spare parts management computer system, establishment and operation of Spare Parts Management Center[3], development of training system for spare parts management; (ii) development of standard operation procedures (SOP) and manuals, simulator training and on-the job training (OJT) for ERCS, provision of ERCS, theoretical training and OJT for radar system maintenance. 3. Inputs (to carry out above activities) Japanese Side 1) Experts: (long-term) 3 persons, (short-term) 10 persons. 2) Training Received: 30 persons. 3) Equipment: Equipment for spare parts management computer system, etc. 4) Local cost: Cost for training of 35 persons by the manufacturers in Nepal etc. Nepalese Side 1) Staff allocated: 25 persons. 2) Building and facilities: Central Management Office for SPMS in TIA, Project Offices in Civil Aviation Authority of Nepal (CAAN) and TIA, etc. 3) Local cost: Cost for training of 24 persons in Malaysia etc.		
Project Period	(ex-ante) January 2014-December 2016 (actual) February 2014-June 2018	Project Cost	(ex-ante) 161 million yen, (actual) 239 million yen
Implementing Agency	Civil Aviation Authority of Nepal (CAAN).		
Cooperation Agency in Japan	Civil Aviation Bureau, Ministry of Land, Infrastructure, Transport and Tourism.		

II. Result of the Evaluation

<Constraints on Evaluation>

- It was difficult to collect additional information to confirm the initial survey results sufficiently from the implementing agency due to time constraint.

<Special Perspectives Considered in the Ex-Post Evaluation>

- The Project Purpose Indicator 1 ("Total duration of Notices to Airman (NOTAMs) regarding Communication, Navigation and Surveillance (CNS) equipment failure in 1st half of 2017 is 20% less than that of 1st half of 2014") was established to measure effect of SPMS to be introduced under the project. The terminal evaluation judged that this indicator was expected to be achieved because significant reduction (more than 20%) was observed in the 1st quarter of 2017 but pointed out that the reduction was mainly due to improvement of CNS equipment and/or decommissioning of old equipment and, therefore, the effect of introduction of SPMS could not be measured properly by this indicator. This indicator, however, was not modified. Following such a perspective of the terminal evaluation, this indicator was used to confirm the achievement status of the Project Purpose with a note on factors contributing to its achievement.
- The initial Overall Goal Indicator 1 ("Total duration of NOTAMs regarding CNS equipment failure in 1st half of 2020 is 40% less than that of 1st half of 2014"), which is considered as the status of Project Purpose Indicator 1 after the project completion, was modified to "Budget for procurement of spare parts of CNS equipment has been requested based on the analysis using the SPMS" to measure the effects of introduction of SPMS more appropriately based on the recommendation of the terminal evaluation. Following such a perspective of the terminal evaluation, the Project Purpose Indicator 1 was not used in confirming the continuation status of the Project Purpose. Continuation of the effects of introduction of SPMS was

[1] ERCS are air traffic control services for aircraft in en-route phase under instrument flight rules, in which air traffic controllers provide instructions of flight route, heading, altitude, flight procedure, etc. to aircraft with the support of radar.

[2] SPMS is defined as optimal provision management system for air navigation equipment parts to enable uninterrupted operation of the equipment, which is composed of nationwide parts database, parts management computer system, parts storage warehouse and parts procurement and transportation systems.

[3] Spare parts of the aviation safety facilities of TIA were stored at TIA while those of other airports were stored at CAAN. Spare Parts Management Center, with the central management office at TIA, was designed to centrally manage the spare parts for all airports by integrating spare parts management of TIA and CAAN technically and net-work wise. In terms of finance, however, budget was to be managed by the respective organizations due to difference in the budget management systems.

confirmed through the modified/latest Overall Goal Indicator 1 mentioned above as well as the Overall Goal Indicator 2 (operation of SPMS).

- For the Overall Goal, there are 2 indicators for SPMS and 1 indicator for ERCS. In assessing achievement status of the Overall Goal, equal weight was given to SPMS (2 indicators together) and ERCS (1 indicator) because SPMS and ERCS are equally important to achieve the Overall Goal. Likewise, the equal weight was given to SPMS and ERCS in evaluation judgement for Continuation of Project Effect and Sustainability.

1 Relevance/Coherence

[Relevance]

<Consistency with the Development Policy of Nepal at the Time of Ex-Ante Evaluation >

The project was consistent with the development policy of Nepal at the time of ex-ante evaluation. The 3-Year Plan (2010/11 to 2012/13) set forth development of tourism industry and domestic economy through development and expansion of the civil aviation system and positions development and expansion of TIA as a top priority.

<Consistency with the Development Needs of Nepal Time of Ex-Ante Evaluation >

The project was consistent with the development needs of Nepal for development of Spare Parts Management Center and ERCS as stated in "Background" above.

<Appropriateness of Project Design/Approach>

The project design/approach was appropriate. No problem attributed to the project design/approach was confirmed.

<Evaluation Result>

In light of the above, the relevance of the project is ③[4].

[Coherence]

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

The project was consistent with the Japan's ODA policy to Nepal at the time of ex-ante evaluation. The Country Assistance Policy for the Nepal (2012) included "building of social infrastructure and mechanisms related to transportation, electricity, urban environment, etc." under one of the 3 priority areas of "Social and economic infrastructure and mechanism development which directly led to economic growth and the national livelihoods improvement".

<Collaboration/Coordination with other JICA's interventions>

The collaboration/coordination between this project and a JICA's grant aid "TIA Modernization Project" (G/A in March 2013) was planned at the time of ex-ante evaluation and was implemented, and the positive effects were confirmed at the time of ex-post evaluation (see "<Status of Achievement of the Overall Goal at the Time of Ex-Post Evaluation>").

<Cooperation with other institutions/ Coordination with international framework>

Any cooperation/coordination with other institutions/international framework was not clearly planned at the time of ex-ante evaluation.

<Evaluation Result>

In light of the above, the coherence of the project is ③.

[Evaluation Result of Relevance/Coherence]

In the light above, the relevance/coherence of the project is ③.

2 Effectiveness/Impact

<Status of Achievement of the Project Purpose at the Time of Project Completion>

At the time of project completion, the Project Purpose was mostly achieved as planned. Total duration of NOTAMs regarding CNS equipment failure in 1st half of 2017 was 99.9% less than that of 1st half of 2014 (target: 20%) although the achievement was mainly caused by factors outside the project[5] (Indicator 1). Through development of the technical documents and provision of training for ERCS under the project as well as installment of the en-route radar system under the grant aid "TIA Modernization Project", ERCS in Kathmandu started from February 2018 and the radar control services were provided with the en-route control level that had not been available previously in Nepal as normal (Indicator 2).

<Continuation Status of Project Effects at the Time of Ex-Post Evaluation>

By the time of the ex-post evaluation, the project effects have been continued. For CNS equipment located in airports, Spare Parts Management Center has been basically utilized by TIA but not by the department in charge at CAAN (Communication and Navigation Aid Department: CNAD), which manage spare parts of the equipment located in domestic airports, because SPMS has not been expanded to the domestic airports as expected[6] mainly due to incompatibility of spare parts of the equipment located there[7]. Other inhibiting factors include lack of budget for expansion and lack of dedicated staff for SPMS (see "Sustainability" for details). The operation manual for SPMS has been utilized for spare parts management, but the plan for the spare parts transportation system (from TIA to the domestic airports) has not been utilized. Around half of CNS equipment is located within TIA and SPMS has not been expanded to the domestic airports as described above; therefore, the spare parts transportation system plan is not deemed necessary, and TIA and CNAD/CAAN are self-managing transportation of the spare parts as in the past. Meanwhile, the SOP, System Operation Manual, Coordination Manual, and Rating Standard for ERCS have been utilized. According to TIA, the radar control services have been continuously provided at the en-route control level, utilizing the skills, knowledge and the technical documents developed under the project and the equipment installed under the grant aid "TIA Modernization Project".

[4] ④:very high, ③:high, ②:moderately low, ①:low * To be the same afterwards.

[5] The achievement was mainly due to improvement of CNS equipment themselves and/or decommissioning of old equipment (see <Special Perspectives Considered in the Ex-Post Evaluation>).

[6] The Joint Terminal Evaluation Report (JTER) reads "effective utilization of the SPMS will be expanded to domestic airports as soon as the labeling of the remaining airports is completed" and the labeling had been completed in 33 domestic airports by the project completion.

[7] According to CAAN, Spare Parts Management Center (or SPMS) has some limitations in terms of compatibility of spare parts. It works well for radar and surveillance equipment located in TIA because this type of equipment is of similar specifications and, thus, compatible; however, it does not work well for other equipment, such as communication and navigation equipment located in both TIA and the domestic airports and the surveillance equipment recently installed in 3 domestic airports, because other equipment is basically of different specifications due to difference in the origins. CAAN considers that utilization of Spare Parts Management Center (or SPMS) may not be relevant to some extent, except for radar and surveillance equipment located in TIA.

<Status of Achievement of the Overall Goal at the Time of Ex-Post Evaluation>

At the time of ex-post evaluation, the Overall Goal has been partially achieved. In the final year of the project, TIA checked the availability of spare parts of CNS equipment in SPMS for budget request. At TIA, SPMS has been basically used to request the budget for procurement of spare parts of CNS equipment because it facilitates development of spare parts requirement list for different fiscal years. Especially, it has been used efficiently and effectively by the division related to radar and surveillance, but not much so by the division related to communication and navigation because of some problems on the compatibility of spare parts of communication and navigation equipment. SPMS has not been expanded to the domestic airports mainly due to the same reason; therefore, it has not been used by CNAD/CAAN to request the budget for spare parts of CNS equipment for the domestic airports (more precisely, communication and navigation equipment and the surveillance equipment recently installed that is not compatible to the existing one) (Indicator 1). As for CNS equipment, SPMS has been basically operational in TIA but not in the domestic airports as described above. SPMS has not become operational for other equipment for air navigation system such as meteorological (MET) and airfield lighting system because the equipment is from different sources and of different companies (Indicator 2). ERCS have been provided without unexpected interruption due to efficient air traffic management promoted by the skills, knowledge and the technical documents developed under the project and the en-route radar control system installed under the above-stated grant aid (Indicator 3).

<Other Impacts at the Time of Ex-Post Evaluation>

Other positive impacts have not been observed. Negative impacts have not been observed, either.

<Evaluation Result>

In light of the above, the effectiveness/impact of the project is ③.

Achievement of Project Purpose and Overall Goal

<table>
<tr><th>Aim</th><th>Indicators</th><th>Results</th><th>Source</th></tr>
<tr><td>(Project Purpose)
Safety and reliability of air traffic control services is upgraded.</td><td>Indicator 1: Total duration of NOTAMs regarding CNS equipment failure in 1st half of 2017 is 20% less than that of 1st half of 2014.

*See <Special Perspectives Considered in the Ex-Post Evaluation>.</td><td>Status of the Achievement: mostly achieved as planned.
(Project Completion)
(unit: hours)
<table><tr><th>1st half of 2014 =A</th><th>1st half of 2017 =B</th><th>Change of duration =B-A</th><th>Rate of reduction =(B-A)/A</th></tr><tr><td>8,775</td><td>7</td><td>8,768</td><td>-0.999
(-99.9%)*</td></tr></table>*See footnote 5 for contribution of this project.</td><td>TIA</td></tr>
<tr><td></td><td>Indicator 2: ERCS are provided normally.</td><td>Status of the Achievement (Status of the Continuation): mostly achieved as planned (continued)
(Project Completion)
-ERCS in Kathmandu started from February 2018 and the radar control services were provided up to en-route control level as normal.
(Ex-Post Evaluation)
-The radar control services have been provided up to en-route control level.</td><td>TIA, a Japanese expert of ongoing technical cooperation project[8]</td></tr>
<tr><td>(Overall Goal)
Safety of air transport is improved.</td><td>Indicator 1: Budget for procurement of spare parts of CNS equipment has been requested based on the analysis using the SPMS.</td><td>(Ex-Post Evaluation) partially achieved.
-SPMS has been basically used to request the budget for procurement of spare parts of CNS equipment in TIA.
-SPMS has not been used by CAAN for budget request for spare parts of CNS equipment in the domestic airports mainly due to some problems on the compatibility of the equipment.</td><td>TIA, CAAN</td></tr>
<tr><td></td><td>Indicator 2: SPMS is operational for air navigation systems equipment including CNS, MET and airfield lighting system.</td><td>(Ex-Post Evaluation) partially achieved.
-SPMS has been basically operational for CNS equipment in TIA but not in the domestic airports.
-SMPS has not been operational for MET and airfield lighting system.</td><td>TIA, CAAN</td></tr>
<tr><td></td><td>Indicator 3: ERCS are sustainably provided.</td><td>(Ex-Post Evaluation) mostly achieved as planned.
-ERCS have been provided without unexpected interruption.</td><td>TIA</td></tr>
</table>

3 Efficiency

Both the project cost and the project period exceeded the plan (the ratio against the plan: 148% and 149%, respectively). The project period exceeded the plan mainly due to (i) a large earthquake in Kathmandu Valley in 2015 and busyness of TIA in accepting relief goods and personnel, (ii) unfixed schedules of the flight inspection of the en-route surveillance radar installed under the grant aid "TIA Modernization Project" and the inauguration of ERCS, and (iii) need for more capacity building for ERCS to be introduced for the first time in Nepal to ensure achievement of the Project Purpose. Because of combined factor, the project cost exceeded the plan. Outputs were produced as planned. In the light above, the efficiency of the project is ②.

4 Sustainability

<Policy Aspect>

The 15th Plan of the Government of Nepal (2019/20-2024/25) sets forth assurance of safe, reliable, and accessible civil aviation services, including safer, high-quality, and more reliable civil aviation services through the adoption of international standards on safety protocols and the optimum utilization of innovative technologies.

<Institutional/Organizational Aspect>

The organizational structures to promote SPMS and ERCS at TIA and CAAN have been unchanged and functioning except for Spare Parts

[8] "The Project for Capacity Development in Operation and Maintenance of Aviation Safety Equipment" (2018-2023).

Management Center that has not been fully utilized. TIA and CNAD/CAAN do not have dedicated staff to promote SPMS and ERCS. So, the allocated staff has other duties. This is one of the reasons why Spare Parts Management Center/SPMS is not being expanded to the domestic airports by CNAD/CAAN. The prospect for improvement is uncertain. Meanwhile, the necessary number of staff is allocated for ERCS because ERCS have been provided normally and sustainably despite no dedicated staff.

<Technical Aspect>

As for SPMS, the relevant staff has maintained the necessary skills and knowledge through training, including SPMS training courses at Civil Aviation Academy developed under the project. Considering that ERCS have been provided normally and sustainably, it is reasonably assumed that the relevant staff maintain the necessary skills and knowledge for operation and maintenance of the ERCS acquired through the project. Regarding ERCS, training including OJT has been also implemented. Staff of TIA and CAAN interviewed by the ex-post evaluation team (4 in total) mention that, although they desire to update the application for ERCS on their own, the technical capacity is not sufficient; however, it is difficult to verify its effects on the continuation of the project effects precisely because further information (e.g., how soon ERCS needs to be updated, why the update needs to be done in-house for the continuation of the project effects, whether solution such as outsourcing is possible etc.) is not available. All the manuals/SOP developed under the project have been utilized. The equipment for spare parts management computer system provided under the project has been maintained in good condition and used as originally intended.

<Financial Aspect>

TIA, in charge of managing Spare Parts Management Center, has secured the necessary budget from CAAN to operate Spare Parts Management Center/SPMS for CNS equipment located in TIA. As for the domestic airports, CNAD/CAAN is considering expansion of SPMS; however, the priority is lower because (i) the need of SPMS has turned out to be low for the domestic airports due to some problems on the compatibility of equipment located there and (ii) the revenue of CAAN was decreased in 2020/21-2021/22 due to the COVID-19 pandemic, which led to prioritization of other activities such as expansion of airport infrastructure and construction work. So, the budget requested by CNAD/CAAN has not been allocated by CAAN yet. It is likely that the revenue of CAAN will increase with relaxation of the COVID-19 related restriction, but it is not certain whether the budget for expansion of SPMS will be allocated from the next fiscal year. Meanwhile, TIA has secured necessary budget for ERCS from CAAN.

<Environmental and Social Aspect>

No issue on environmental and social aspect has been observed and it has not been necessary to take any countermeasures.

<Evaluation Result>

In light of the above, slight problems have been observed in terms of the [policy / institutional/organizational / technical / financial / environmental and social] aspects of the implementing agency. Therefore, the sustainability of the project effects is ③.

5 Summary of the Evaluation

The project mostly achieved as planned the Project Purpose ("Safety and reliability of air traffic control services is upgraded") and partially achieved the Overall Goal because SPMS for CNS equipment has not been expanded to the domestic airports mainly due to some problems on the compatibility of equipment and SPMS has not been operational for other air navigation system). The effects of the project have continued. Regarding Sustainability, slight problems have been observed in terms of institutional/organizational and financial aspects (i.e. there is lack of dedicated staff and budget for expansion of SPMS to the domestic airports while no problems have been observed with ERCS) and technical aspect (i.e., there is insufficient technical capacity to update the application for ERCS within the implementing agency[9] while no problems have been observed with SPMS). Meanwhile, no problems have been observed in terms of policy and environmental and social aspects. As for Coherence, collaboration/coordination with a JICA's grant aid project planned at the time of ex-ante evaluation was implemented, and the positive effects were confirmed. The project cost and the project period exceeded the plan. Considering all of the above points, this project is evaluated to be highly satisfactory.

III. Non-score Items

Adaption and Contribution:

JICA supported for ensuring smooth communication between the counterpart and the project. JICA was involved in trouble shooting when any issues arose and was in touch with the related counterparts from CAAN and TIA.

Additionality and Creative Values:

New idea and technology were introduced by the introduction of spare parts management application. The new application is beneficial for efficient identification of spare parts needs and availability.

IV. Recommendations & Lessons Learned

Recommendations for Implementing Agency:

- It is recommended that CAAN allocate adequate budget for expansion of SPMS to domestic airports as per the demand from CNAD/CAAN from the next fiscal year if the revenue increases with relaxation of the COVID-19 related restriction.

Lessons Learned for JICA:

- For SPMS, compatibility of the equipment in domestic airports should have been assessed during the project design.

[9] It is noted that its effects on the continuation of the project effects could not be verified due to lack of information.

SPMS working properly for radar equipment, TIA.

This project strengthened the Surveillance System procured under the Grant Aid “TIA Modernization Project”, which is used to provide ERCS.