Internal Ex-Post Evaluation for Technical Cooperation Project

Country Name	**The Project of Human Resource Development through Utilizing the Information Technology for Rural Community Vitalization**
Kingdom of Thailand	

I. Project Outline

Background	Thailand had promoted to build a knowledge-based economy and society to become a medium-level IT (information technology) nation in international terms and emphasized on the utilization of basic information technology, development of IT human resources and construction of information and telecommunications infrastructure. On the other hand, construction of the information and telecommunications infrastructure in rural areas was slow: rural areas still did not have access to telephones, the internet and other information and telecommunications infrastructure. As a result, a digital divide between urban and rural areas emerged, and this was seen to be contributing especially to other disparities in terms of economy, education and quality of life in recent years. Rectification of the digital divide thus became one of the priority development issues facing Thailand. Under that situation, in 2005, the government of Thailand submitted a request to the government of Japan for technical cooperation concerning model development and demonstration of testing technology for a wireless communications system in provincial areas.
Objectives of the Project	The project is aiming to develop the rural wireless communication system (RWCS) through demonstration of testing RWCS in the model sites and development of curriculums and contents, thereby applying the established RWCS model to other provinces.
	1. Overall Goal: Rural wireless communication system is applied for rural communities' vitalization. 2. Project Purpose: To strengthen the capability of the National Electronics and Computer Technology Canter (NECTEC) in developing the effective rural wireless communication system in the Kingdom of Thailand.
Activities of the project	1. Project site: NECTEC at Science Park (Pathumthani Province) and three districts (Pai district, Mae Hong Son district, and Mae Sariang district) in Mae Hong Son Province 2. Main activities: (i) testing and demonstration of RWCS model in the pilot sites using WiMAX[1], (ii) provision of on-the-job training (OJT) for counterpart staff, training for local instructors and facilitation of training for local users by local instructors in the target provinces, (iii) development of curriculums and contents, and (iv) promotion of the applications of the curriculums in other areas in Thailand based on the lessons learned from the project. 3. Inputs (to carry out above activities) Japanese Side 1) Experts: 5 persons 2) Trainees received: 4 persons 3) Equipment: Equipment and materials for Trial Test and software for WiMAX Site Planning Thai Side 1) Counterpart personnel: 23 persons 2) Land and facilities: Project office 3) Local cost: Costs for Trial Test and domestic training of counterpart personnel

Ex-Ante Evaluation	2008	Project Period	April 2009 – March 2012 (Extension Period: May 2011 – March 2012)	Project Cost	(Ex-Ante) 322 million yen (Actual) 569 million yen
Implementing Agency	National Electronics and Computer Technology Center (NECTEC)				
Cooperation Agency in Japan	Japan Development Service Co., Ltd. (JDS)				

II. Result of the Evaluation

1 Relevance

<Consistency with the Development Policy of Thailand at the time of ex-ante evaluation and project completion>

This project was consistent with Thailand's development policy "to promote a knowledge-based economy and society to become a medium-level IT nation in international terms" as set forth in the policy documents, including *the 10th Economic and Social Development Plan* (2007-2011), *the Thailand Information Technology Policy Framework* (2001-2010) (IT2010), *the 11th Economic and Social Development Plan* (2012-2016) and *the Thailand Information and Communication Technology Policy Framework* (2011-2020) (ICT2020).

<Consistency with the Development Needs of Thailand at the time of ex-ante evaluation and project completion>

This project met the development needs of Thailand to promote the community development and mitigation of regional disparity between urban and rural areas through application of wireless communication system.

<Consistency with Japan's ODA Policy at the time of ex-ante evaluation>

This project was consistent with Japan's Country Assistance Program for Thailand (2008) to prioritize on strengthening competitiveness for sustainable growth as one of the four priority areas, which included infrastructure development for industrial promotion (human resource development and institutional building).

<Evaluation Result>

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

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[1] WiMAX (Worldwide Interoperability for Microwave Access): It is one of the radio communication technology standards which enable to provide connections in areas with difficulties to install high-speed communication lines (optical or metal lines) or DSL (digital subscriber line). It was used for ensuring communication environment in the pilot sites with limited information communication infrastructure.

2 Effectiveness/Impact

<Status of Achievement for the Project Purpose at the time of Project Completion>

   The project purpose was achieved by the project completion. The project was able to establish the RWCS model using WiMAX after testing the model in the pilot sites in the three districts in Mae Hong Son Province, and the model was proposed to the National Broadcasting and Telecommunications Commission (NBTC). Also, NECTEC's knowledge and skills about technologies of Wireless Communication System were enhanced and the number of local trainers who have capacities for training and system operation increased as a result of technical transfer and provision of training by the project. It was confirmed that the level of the end users' satisfaction on the RWCS developed by the project was generally higher than at the start of the project because of better and more hardware (improved network such as more Wi-Fi access points and more PCs to be used) and more e-Learning contents provided as a result of the project. On the other hand, there was a room for improvement such as more stability of WiMAX service, internet access through WiMAX network, quick restoration from the system problems, and so on.

<Continuation Status of Project Effects at the time of Ex-post Evaluation>

   Based on the recommendation by the terminal evaluation in 2012, NECTEC established a sustainability plan for operation and maintenance (O&M) of WiMAX system by dividing the WiMAX system into three subsystems: (i) WiMAX Base-station (4 base sites in three district areas), (ii) WiMAX Client including the computer system (in 45 client sites in stalled by the project during the project period), and (iii) Core Network Service. Each subsystem was assigned to the responsible organization for O&M. Meanwhile, the WiMAX frequency provided for the project was only for their test signal and available only for the project period[2]. For this reason, the sustainability plan has been implemented only for the computer system at project sites and core network service at the time of ex-post evaluation.

   The RWCS has been maintained in the target three districts continuously by using other wireless internet services provided by the private companies and Ministry of Education under this circumstance. At the time of ex-post evaluation, the RWCS has been utilized in the 4 Base sites and the 46 client sites. The number of client sites increased by 1 site in Mae Hong Son after the project completion. Therefore, although WiMAX is not available in the model sites after the project completion, the project effects have been maintained at the time of ex-post evaluation.

<Status of Achievement for Overall Goal at the time of Ex-post Evaluation>

   The overall goal has been achieved. The RWCS model developed by the project was modified and updated by NECTEC in order to be suitable for other provinces. At the time of ex-post evaluation, five provinces such as Chiangmai Province, Tak Province, Kanchanaburi Province, Petchaburi Province and Prachuap Khiri Khan Province have newly introduced the RWCS model in addition to Mae Hong Son Province. For example, in these five provinces, the following services such as e-Health[3] and e-Learning were introduced by the RWCS with 2,000 users.

<Other Impacts at the time of Ex-post Evaluation>

   No negative impact on natural environment and no land acquisition and resettlement by the project were confirmed at the time of ex-post evaluation.

<Evaluation Result>

   In light of the above, through the project, the project purpose was achieved, the project effect has been continued, and the overall goal was achieved. Therefore, the effectiveness/impact of the project is high.

Achievement of project purpose and overall goal

Aim	Indicators	Results
(Project Purpose) To strengthen the capability of NECTEC in developing the effective rural wireless communication system in the Kingdom of Thailand.	(Indicator 1) Development of the Rural Wireless Communication System Model which was examined by Trial Test.	Status of the achievement: (Project completion) achieved. • The RWCS Model was completed in February 2012. (Ex-post Evaluation) continued. <table><tr><td></td><td>Mae Hong Son</td><td>Mae Sariang</td><td>Pai</td></tr><tr><td>No. of pilot sites using RWCS*</td><td>1Base site 20 client sites</td><td>2 Base sites 16 client sites</td><td>1 Base site 10 client sites</td></tr></table> * The Pilot Sites are composed of the Base site and the Client sites with PCs to use services.
	(Indicator 2) Enhancement of knowledge and skills of NECTEC about technologies of Wireless Communication System.	Status of the achievement: (Project completion) achieved. • NECTEC acquired necessary knowledge and skills about technologies of Wireless Communications System, including wireless technology, contents development, and remote class, by technology transfer from the Japanese experts. (Ex-post Evaluation) continued • NECTEC staffs modified and updated the RWCS model to be suitable for other provinces. • NECTEC staffs have been using the knowledge of RWCS to apply for other provinces such as Chaingmai, Mae Hong Son, Tak, Kanchanaburi, Petchaburi and Prachuap Khiri Khan.

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[2] NBTC has no clear policy about the WiMAX frequency spectrum and they have not renewed the frequency license to NECTEC after the project completion.

[3] Remote out-patient system at local hospital, such as videoconference system and remote physical examination.

	(Indicator 3) Increase of local trainers who have capacities for training and system operation.	Status of the achievement: (Project completion) achieved. • According to the impact survey conducted by the National Science and Technology Development Agency (NSTDA) team, the number of local training instructors was increased to 25 and their skills in wireless communication system were improved. (Ex-post Evaluation) Partially continued • 15 local training instructors have been engaged in trainings on system administration, wireless system and e-learning system and system operation of RWCS continuously.
	(Indicator 4) Enhancement of skills and knowledge of Field Trial Testing.	Status of the achievement: (Project completion) achieved. • According to the evaluation study report of RWCS Field Trial Testing by NECTEC, it was well designed and successfully conducted. Namely, through the project activities, skills and knowledge of the NECTEC staffs for the Field Trial Testing were enhanced. (Ex-post Evaluation) continued • NECTEC staffs have been using the knowledge of RWCS to apply for other provinces such as Chaingmai, Mae Hong Son, Tak, Kanchanaburi, Petchaburi and Prachuap Khiri Khan.
	(Indicator 5) Proposal and Recommendation to NBTC about proposed RWCS Model.	Status of the achievement: (Project completion) achieved. • The RWCS Development Model was proposed to NBTC at the final seminar in March 2012. (Ex-post Evaluation) continued • RWCS model was modified and updated by NECTEC in order to be suitable for other provinces. The updated RWCS model has been applied to the marginalized area in other provinces such as Chiangmai, Mae Hong Son. Tak, Kanchanaburi, Petchaburi and Prachuap Khiri Khan.
	(Indicator 6) Satisfaction of model users in model site.	Status of the achievement: (Project completion) Partially achieved • According to the impact survey conducted by NSTDA, the questionnaire, the interviews, and the level of the end users' satisfaction was generally higher than at the start of the project because of better and more hardware (improved network, more Wi-Fi access points, more PCs) and more e-Learning contents provided as a result of the project. • However, there were still demands and requests from the end users such as more stability of WiMAX service, internet access through WiMAX network, quick restoration from the system problems, and so on. These demands and requests were not necessarily stemmed from negative impacts of the project, but from being able to use WiMAX service more effectively and efficiently. (Ex-post Evaluation) continued • The RWCS model has been utilized in the model sites continuously by using other wireless internet services and the users have been satisfied with the service.
(Overall goal) Rural wireless communication system is applied for rural communities' vitalization.	(Indicator 1) Provinces introducing the Rural Wireless Communication System.	Status of the achievement: achieved (Ex-post Evaluation) • Six provinces (Chiangmai, Mae Hong Son, Tak, Kanchanaburi, Petchaburi and Prachuap Khiri Khan) introduced by RWCS.
	(Indicator 2) Types and scale of users in the provinces introducing Rural Wireless Communication System.	Status of the achievement: achieved (Ex-post Evaluation)

Status of the achievement: achieved
(Ex-post Evaluation)

	Mae Hong Province	Other five provinces
New types of uses and services introduced by RWCS	Remote court, videoconference	e-Health (), e-Learning
Number of new users introduced by RWCS	20 users	2,000 users (Estimated around 400 users in each province)

Note: Other five provinces are Chiangmai Province, Tak Province, Kanchanaburi Province, Petchaburi Province, and Prachuap Khiri Khan Province.

3 Efficiency

Both the project cost and project period significantly exceeded the plan (ratio against the plan: 177% and 144% respectively). The reason for the cost overrun was that the plan on equipment procurement was changed from procurement in Thailand to procurement in Japan, which required additional procurement cost. The reasons for delay were (i) the delay in procurement of equipment, and (ii) interruption of the project implementation due to the flood. Therefore, the efficiency of the project is low.

4 Sustainability

<Policy Aspect>

The community development and mitigation of regional disparity through application of wireless communication system has been promoted by the Thai government continuously. For example, *the Thailand Digital Economy and Society Development Plan 2016* states that the government of Thailand promotes the access to broadband and free Wi-Fi by at least 10,000 locations, including formal/non-formal schools.

<Institutional Aspect>

NECTEC is responsible for continuation of the project activities and O&M of RWCS including (i) modification and dissemination of RWCS development model; (ii) system operation and maintenance for Learning Management System (LMS) server; (iii) development of e-Learning contents; and (iv) training of related knowledge and skills. In particular, the Wireless Information and Security Research Unit (WISRU) of NECTEC is in charge of technical support for the WiMAX system to Mae Hong Son organization and the system administration for Core Network Service. Eighteen NECTEC staffs including five WISRU staffs received technical transfer through the project and they have been working at NECTEC continuously except one person who left for a new job. NECTEC considers that they can handle the above O&M works with the current number of staff.

<Technical Aspect>

The NECTEC staffs have maintained the knowledge and skills for continuation of project activities and O&M of the RWCS. For example, NECTEC staffs have been supporting Mae Hong Son Province to continue the project activities through providing the training about the LMS for e-Learning and video conference server to Mae Hong Son organization, conducting e-Learning contents training to the Mae Hong Son schools, etc. Also, NECTEC has organized a training program on the network administration for WISRU staff twice a year to maintain and upgrade their knowledge and skills transferred by the project. The guidelines and manuals developed by the project such as system operation guideline have been utilized by NECTEC continuously.

In terms of the current status of the equipment provided by the project, the WiMAX system has been well maintained and ready for use despite the fact that it has not been in use due to the issue of frequency license. On the other hand, the WiMAX Client (including computer system) at the 45 Client sites[4] and the Core Network Service such as Videoconference Service have been maintained as well since they have been able to use other wireless internet providers instead of the WiMAX.

<Financial Aspect>

NECTEC has received 500,000 Baht every year during 2013-2015 for the budget for the continuation of project activities and O&M of RWCS as mentioned above. According to NECTEC, the allocated budgets are sufficient. Since the government of Thailand currently has policy to expand more ICT in the rural area including Mae Hong Son, the budget for providing ICT in rural areas can be expected to be sufficiently allocated for the new area including the existing area.

<Evaluation Result>

In light of the above, No problem has been observed in terms of the policy, institutional, technical and financial aspects. Therefore, the sustainability of the effectiveness through the project is high.

5 Summary of the Evaluation

The project has achieved the project purpose and overall goal. The project was able to establish the RWCS Development Model using WiMAX in the pilot sites successfully and to enhanced knowledge and skills about technologies of Wireless Communication System of NECTEC and local trainers by the project completion. By the end of project completion, a sustainability plan for O&M of WiMAX system was established by NECTEC. The RWCS has been maintained in the target three districts continuously by using other wireless internet services after WiMAX became not available in the target three districts. After modification and updating of the RWCS model by NECTEC, the RWCS model was further introduced to other five provinces with introduction of new types of services such as e-Health. Regarding sustainability, no problem has been observed in terms of the policy, institutional, technical and financial aspects. For efficiency, both the project cost and project period significantly exceeded the plan due to change in the procurement plan and interruption of the project implementation due to the flood.

Considering all of the above points, this project is evaluated to be satisfactory.

III. Recommendations & Lessons Learned

Recommendations for Implementing Agency:
- As it is uncertain whether the renewed WiMAX frequency license will be provided to NBTC by NECTEC or not at present, it is recommended that NECTEC should clarify the policy and operational framework for WiMAX network system considering two scenarios of approval and non-approval of the license.
- It is likely that NECTEC keeps the technical knowledge and skills based on the O&M works with the current number of staff and training program twice a year. Further improvement is recommended for the issues of staff turnover within NECTEC.

Lessons learned for JICA:
(1) Effectiveness of Local Participatory Approach for Pilot Projects
- Although this project was focused on a technology transfer to NECTEC, the project was able to solve various issues and challenges associated with utilization of the high-speed wireless network with the local users as a result of demonstrating pilot projects. This

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[4] The Client sites such as schools and community college, government offices, and communities equipped by the project were as follows: 19 sites in Mae Hong Son, 16 sites in Mae Sariang and 10 sites in Pai. After the project completion, 1 Client site was added in Mae Hong Son.

promoted the understanding of users on the network management, which led to smooth network operation. Therefore, at the planning stage, it is necessary to consider an effective participatory approach and demonstration effects of pilot projects with participation of local people and communities to promote IT in the remote areas isolated from the state-of-the-art technology.

(2) Importance of Open System for Modification/Upgrading

- The project established the RWCS model by using WiMAX frequency provided for only the project period. After the project completion, the RWCS model was modified and updated by NECTEC in order to be suitable for other provinces by other types of wireless communication services. For this reason, the modified/updated RWCS model was further disseminated to other provinces. Thus, the fact implies that versatility of RWCS model should be carefully considered at the time of project planning and examined at the time of project implementation in order to ensure sustainable service provision as well as dissemination of the model nationwide.

The antenna in the middle is the one which was provided during this project.

TV meeting room at Mae Hong Son Provincial Police Operations Center. They are using the system which was provided during this project period (The system has been updated after the project).