

1. Outline of the Project		
Country : Kingdom of Thailand	Project Title : The Project on Technical Strengthening of National Institute of Metrology (Thailand) Phase 2	
Issue/ Sector : Private Development – Industrial Foundation and System		
Division in Charge : JICA Thailand Office	Cooperation Scheme : Project Type Technical Cooperation	
Period of Cooperation	16 th October	Total Cost : 300 million Japanese Yen (As of the Study)
	2004 – 15 th October	Partner Country's Implementing Organization : National Institute of Metrology (Thailand) (NIMT)
	2007 (3 years)	Supporting Organization in Japan : Measurement and Intellectual Infrastructure Division, Industrial Science Technology Policy and Environment Bureau, Ministry of Economy, Trade and Industry, National Metrology Institute of Japan (NMIJ), Japan Quality Assurance Organization (JQA), Japan Electric Meters Inspection Corporation (JEMIC), National Institute of Technology and Evaluation (NITE), Chemicals Evaluation and Research Institute, Japan (CERI)
		Related Cooperation : 24 th and 25 th ODA Loans by JBIC

1-1 Background of the Project

Thai industry has needed to produce goods of higher quality and improve their competitiveness for export promotion. In the 8th National Economic and Social Development Plan (1997-2001), the Government of Thailand expressed the necessity of development of the National Metrology System for enhancing the reliability of export goods of Thailand.

In August 1997, the Government enacted the National Metrology System Development Act to strengthen the international competitiveness of domestic industries. In accordance with this Act, the National Institute of Metrology, Thailand (NIMT), was established in June 1998 to commence the development of the National Measurement Standards in Thailand. The Cabinet approved the Master Plan on the National Metrology System Development in May 1999.

Responding to these efforts of the Thai Government, the Government of Japan decided to provide ODA Loans from 2000 (24th and 25th ODA Loans by JBIC) for the construction of the new NIMT building and the procurement of the necessary equipment.

The Government of Thailand requested the Government of Japan in 1999 to implement the Project for technical transfer, which is designed to strengthen the capability of NIMT to maintain and supply National Measurement Standards using equipment produced by the Japanese ODA Loans mentioned above.

In response to this, JICA was considering 5-year technical cooperation project at that time. However due

to the delay of new building construction by ODA loans, finally JICA decided to divide the project into two phases. (Phase1: 2-year, Phase2: 3-year). During Phase1 cooperation, which started from Oct. 16, 2002, project only focused on limited quantities, which could be available at the previous building. Since construction of the new building also progressed without any problem, and the result of technical cooperation in Phase1 was fruitful, Phase2 cooperation was started from Oct. 16, 2004.

Through the technical cooperation including Phase1 and Phase2, project was supposed to achieve “NIMT established and manages National Measurement Standards with Internationally recognized level of accuracy” in the eight fields. (Length, Mass, Time & Frequency, Electricity & Magnetism, Photometry, Thermometry, Chemical and Acoustics & vibration)

At the time of the mid-term evaluation study was conducted on October 2006, the number of quantities for technical cooperation was set to 40 quantities, and it was also recommended that the necessary quantities shall be accredited by the end of the project from a standpoint of international reliability. Those points were reflected in the following activities.

* The most accurate standard in the country is called as “National Standard”, the lower-level standard shall be set based on “National Standard”. NIMT is required the skill and knowledge to maintain “National Standard” and calibrate the lower-level standard. To calibrate with the lower-level standard is called “Providing the standard”.

1-2 Cooperation Overview

The Project was planned for five years at the time of formulation. However, due to the delay in construction of a new building and procurement of machinery and equipment, the Project was divided into 2 phases. The Phase 1 was scheduled for 2 years and started from October 16, 2002, after the Record of Discussion (R/D) was signed in September 2002. The Phase 2 started from October 16, 2004, after the completion of the Phase 1. Throughout the Phases 1 and 2, the Project aims to provide technical transfer in 8 fields of measurement standard, in total of 40 quantities.

(1) Overall Goal

To strengthen the national measurement system in Thailand.

(2) Project Purpose

NIMT establishes and manages National Measurement Standards with Internationally recognized level of accuracy

(3) Project Outputs

- 1) The operation and administration of the Project are enhanced.
- 2) The equipment is operated and maintained properly.
- 3) The technical capability of C/P is upgraded.
- 4) Accuracy of national measurement standards is improved.
- 5) NIMT disseminates national measurement standards properly.

(4) Project Inputs

Japanese side:	(): by the end		
Long term expert	5 persons	Equipment supply	3.8million Japanese Yen
Short term expert	30 persons (36)	Project cost	300 million Japanese Yen
No. of trainees	16 persons		
Received in Japan			
Thai side:			
Counterparts	37 persons (Management: 1 person, Engineering: 36 persons)		
Local cost	Approx. 15 million Japanese Yen (4 million Thai Baht)		
In kind			

2. Evaluation Team and Period

Members	Mr. Narihiro YAEGASHI (Team Leader)	Deputy Resident Representative, JICA Regional Support Office for Asia
	Mr. Yoji MATSUI	Deputy Director, Measurement and Intellectual Infrastructure Division, Industrial Science Technology Policy and Environment Bureau, Ministry of Economy, Trade and Industry (METI)
	Dr. Katsuo SETA	Chief Executive, International Accreditation Japan (IAJapan), National Institute of Technology and Evaluation (NITE)
	Dr. Yoshio, HINO	Director, International Metrology Department, Metrology Standard Management Division, Advanced Industry Science and Technology (AIST)
	Mr. Kazuya MARUO Ms. Thanyatorn Singrueng	Assistant Resident Representative, JICA Thailand Office Researcher, Kokusai Kogyo (Thailand) Co., Ltd
Period of Evaluation		Type of Evaluation
11 th June, 2007 – 22 nd June, 2007		Terminal Evaluation

3. Results of Evaluation

3-1 Summary of Evaluation Results

(1) Output 1: The operation and administration of the Project are enhanced.

Indicator

1-1: Staff and budget are allocated to the project

- The allocation of the C/P and dispatch of long-term experts were done as planned, and short-term experts were also dispatched as planned except some quantities, which the machinery and equipment were delayed. Regarding the budget for the Project in Japanese and Thai sides were secured.

(2) Output 2: The equipment is operated and maintained properly.

Indicator

2-1: National Measurement Standards are installed and established in the 40 quantities of the project.

2-2: Registration of maintenance record and calibration record of equipment.

2-3: Manuals of operation and maintenance management are provided and organized for reference.

- The technical transfer has been completed in 37 quantities by the end of May 2007, and 42 quantities¹ are supposed to finish the technical transfer by the time of the completion of the Project. After the installation and establishment of the national measurement standard, calibration records of the equipment has been done, and the manuals of operation and maintenance management of existing machinery and equipment of the Project are provided and organized properly.

(3) Output 3: The technical capability of C/P is upgraded.

Indicator

3-1: Technical Cooperation Program is created.

3-2: C/Ps are appropriately assigned.

- NIMT has the technical cooperation program prepared at the beginning of the Project. C/Ps are also allocated properly.

3-3: Improvement in the uncertainty.

3-4: Point of the "Skill after training".

- The budget of uncertainty has been improved in 14 quantities while 6 quantities was planned to be improved by the time of the completion of the Project. Based on the evaluation by using the evaluation sheet, the point of "skill after training" of all C/Ps has been improved.

3-5: Number of seminars and joint training.

- According to the record of seminars, the number of seminars that were conducted by April 2007, is 33 times covering in 32 quantities.

(4) Output 4: Accuracy of national measurement standards is improved.

Indicator

4-1: Improvement in the uncertainty.

4-2: Registration of environmental data for every laboratory.

4-3: Number of international comparison implemented.

- The number of accreditation obtained during the Project reaches 14 quantities, which application procedure requires the preparation of uncertainty budget sheet and the registration of environmental data. Moreover, 23 comparisons in 12 different quantities have been implemented in the focus of

accuracy improvement.

(5) Output 5: NIMT disseminates national measurement standard properly.

Indicator

5-1: Improvement in calibration technology for reference standards.

5-2: Number of calibration procedures created.

- 41 traceability charts for each quantity available and the calibration procedure has been provided in 37 quantities while 17 quantities are in the process.

5-3: Items pointed by evaluation of quality system and the way to solve the items.

- The quality system is assessed by the accreditation process. As the result of assessment of the accreditation, items which were not adequate or did not meet the requirement are pointed out. By the end of May 2007, the Project has been applied and got assessed for the accreditation in 14 quantities and it has plan to apply further more in 6 quantities by the time of the termination of the Project.

3-2 Summary of Evaluation Results on 5 Criteria

(1) Relevance

The relevance of the Project is assessed still high based on the following reasons; 1. There is needs from industrial sector; 2. Importance of metrology system in the 10th National Economic and Social Development Plan (2007-2011); 3. The purpose of the Project meets the Japanese policies of ODA charter.

(2) Effectiveness

The result of assessment on Outputs indicates that the degree of realization of Outputs is considerably high. Besides, the relevance of the important assumptions is confirmed as effective as before.

The project purpose has been generally achieved due to the adequate outputs generated by the inputs planned in the Project and enormous efforts from Japanese and Thai sides.

It, however, is notable that unfortunately the delay of new building construction and procurement of equipments affected the technical cooperation for some quantities and worked as a hindering factor to lower the achievement of the project purpose² to a certain extent. This factor has been identified as a precondition of the Project, which is known as uncontrollable by the Project according to the evaluation methodology.

To expedite the process of equipment procurement by ODA Loans, NIMT took action including change of bidding method and etc...

(3) Efficiency

The timing of various inputs can be evaluated highly adequate due to its flexibility in accordance with the schedule of procurement. Moreover, the management of the Project has been remarkably well done under the collaboration of Japanese loan scheme. (E.g. Training in Japan (3 months) → Self-learning (2 months) → Follow-up training with using the equipment by ODA loans (1 month))

Most of expected outputs could be generated with the appropriate practice of equipments and machineries, however, the delay of procurement influenced slightly negatively on the generation of outputs also in this aspect.

(4) Impact

Since indicators verifying the achievement of the project overall goal have emerged in some fields according to the result of the evaluation survey of document review, interview, the current status of the

impact could be considered quite positive and makes us expect the real achievement of overall goal in future if the project purpose is achieved with much higher level of satisfaction. This could imply directly the attainment of accreditation as in many quantities would promise the achievement of the project purpose and consequently project overall goal.

As a ripple effect, NIMT conducts seminars and workshop for ASEAN region on metrology periodically, therefore the visibility of NIMT in ASEAN region will increase in the future.

(5) Sustainability

Assessing comprehensively the facts and findings above, it could be concluded that the sustainability of the Project depends primarily on the firm establishment of National Measurement System with NIMT as its top organization and technical advantage of NIMT in this system under the corresponding of the current political support.

In order to confirm the sustainability of the Project, the accreditation should be attained by all means since it assures the accuracy of calibration and the traceability of quantities in the system.

3-3 Factors enhancing the Achievement

(1) Relate to Planning

- The National Metrological System Development Act stipulates NIMT to play their roles and responsibilities as the institute to develop metrology system, procure and maintain national standards and still effective. Therefore, this system could disseminate smoothly the outputs generated by the Project to the target groups/ organizations.

(2) Relate to Implementation

- A series of meetings was conducted every month since the beginning of the Project. Additionally, the JCC meeting is also conducted twice a year in order to maintain the mutual understanding between Japanese side and Thai side.

3-4 Factors hindering the Achievement

(1) Relate to Planning

None

(2) Relate to Implementation

- The precondition of the Project: “Equipment by ODA Loan for the Project is procured as planned” is not fulfilled in some components through the Project term. This affected the generation of the project outputs negatively. In order to achieve “Internationally recognized level of accuracy”, accreditation assessment shall be a part of the Project activities. Therefore it is not appropriate to terminate the Project as scheduled.

3-5 Conclusion

Technical transfer of all quantities will be completed by the end of the Project, although the construction of new NIMT building and procurement of equipment were delayed in Japanese ODA loan. However, some accreditation assessment will not be accomplished within the Project term due to the above-mentioned delay.

It is assessed based on the actual result that most of quantities³ targeted in the Project can be accredited within one year after the termination of the Project. To achieve the initial Project purpose, the term of Project shall be extended by October, 2008.

3-6 Recommendation

a. Extension of project term

In this project, the technical transfer part is almost completed on 42 quantities, however in order to achieve “Internationally recognized level of accuracy”, only 14 quantities of a total of 37 quantities for accreditation assessment have accomplished at present, due to the delay of construction of new NIMT building and procurement of equipment by Japanese ODA loan. To firmly establish the result of this technical transfer in the form of accreditation in gaining international approval, and considering the request of the Project extension from NIMT, one year extension of the Project term would be appropriate, because most of quantity can be accredited during the extension periods.

b. Chemical standard

Regarding items of measurement standard for GUIDE 34⁴ in chemistry, it is rather difficult to obtain accreditation within one year extension periods. Therefore, to establish the quality system for gaining accreditation in the extension periods is preferable. To achieve this goal, it is needed for engineers in NIMT to participate in the training course on GUIDE 34 and GUIDE 35⁵.

c. CIPM-MRA appendix C⁶

NIMT should accelerate to register the transferred quantities on Appendix C of CIPM-MRA to be recognized internationally for the improvement of technical competence.

d. Sustainable human resource development

Comparing the evaluation of C/P between just after finishing technical transfer and some months later, the skill development and self motivation were found. Therefore the foundation of their self-sustaining human resource development was built. We hope that this continuous motivation is maintained in the future.

e. Human resource

The effort by minimum number of staff is definitely deserved, however to secure maintenance and dissemination of measurement standard, it is preferable for NIMT to ensure the necessary number of engineers and to intensive staff deployment in accordance with the future importance of measurement standard.

f. Consistency and conformance in management system

Through the Project, NIMT has increasing number of quantities getting assessed for the accreditation. In order to implement the accreditation in many quantities effectively, it is highly recommendable to set up a section which deals with the quality system as its specialty and secures the consistency and conformance of DQM (Department Quality Manual) and technical manual. It is important to establish a cross-sectional communication system between the each department, and prepare a system to deal with management system and required items which are in common among the departments.

g. Facility

In case of standard gas, although the installation of equipment and technical transfer was completed, the

storage facility is unfinished. It is preferable to implement required measures by NIMT as soon as possible.

h. Safety control

The lack of safety control, such as untied high pressured gas tanks, was observed. It is highly recommended to avoid this pre-accident situation immediately.

i. Domestic dissemination

The NIMT contributes to secondary calibration organizations⁷ in domestic traceability system⁸. It is preferable to review the modalities of efficient contribution on the cooperation with accreditation body and calibration service to major users.

j. International dissemination

In the future, it is expected that NIMT can promote NIMT-traceable measurement standard and become hub-organization in the ASEAN countries by utilizing the result of the Project.

3-7 Lessons learned

Regarding the project collaborated with Japanese ODA loan, the possibility of the schedule delay (ex. The procurement of equipment is not proceed smoothly) shall be taken into the consideration in the planning stage of the Project.

3-8 Follow-up status

None

¹ After commence of the Project, NIMT requested additional two quantities, and these quantities were considered reasonable. So, the total number became 42 quantities.

² To establish National Measurement Standards with internationally recognized level of accuracy, it was defined that the project purpose contains the accreditation assessment in the mid-term evaluation.

³ NIMT is planned to accredit 35 quantities without “Inorganic Standard Solution” and “Organic Standard Solution” in the extension period.

⁴ General Requirements for the competence of reference material producers

⁵ Certification of reference materials – General and statistical principle

⁶ Database on calibration and measurement capability of National Metrology Institute.

⁷ Registered organization to have Standard, which calibrated with primary Standard.

⁸ Measure is calibrated by Standard, Standard is also calibrated by more accurate Standard. Most accurate Standard is the National Metrology Standard. These linkages are called as “traceability system”.