

"Feasibility Survey and Pilot Project for
Disseminating SME's Technologies to
Developing Countries" under the
Governmental Commission on the Projects
for ODA Overseas Economic Cooperation
in FY2012

Summary Report

Lao PDR

**Pilot Project on Wooden House
Construction Technology with Pre-cut
Machine**

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This report is a summary of a feasibility survey and pilot project disseminating SME's technologies to developing countries conducted by the contractor, under the Governmental Commission on the Project for ODA Overseas Economic Cooperation, commissioned by the Ministry of Foreign Affairs of Japan in Fiscal Year 2012. It does not necessarily represent the official views of the Ministry of Foreign Affairs of Japan.

[Abstract]

I . Description of the current situation and development needs of the concerned development issues in the surveyed country

The Lao People's Democratic Republic (Laos) faces the following socio-economic development issues:

- 1) Effective use, preservation and plantation of forest resources: Unused resources such as pine, and trees cut down for hydroelectric power and mineral resources aren't being used effectively.
- 2) Development of the wooden housing industry: Skills for wood processing, housing construction and termite control are lacking in the two key industries of timber and construction, resulting in the underdevelopment of the wooden housing industry.
- 3) Improvement in housing situations: Although wood is the best suited material for building houses in Laos, most of the middle class live in brick and concrete houses due to the above reasons.

II . Possible applicability of the SME's products and technologies, and prospects for future business development

1. Possible applicability of the SME's products and technologies

The construction of wooden houses using pre-cut wood (pre-cut system) is a skill unique to Japan. The pre-cut system creates functional walls that provide control over the openness of living spaces to the outside environment, improving the livability and amenity of the house. Japan also possesses the most advanced technology for earthquake-resistant buildings in the world.

The pre-cut system uses specialized machines to process (cut) housing materials, which is traditionally the work of craftsmen. The main features of the system are:

- 1) It is a unique technology of Japan.
- 2) Machines provide high-speed craftsmanship and accurate processing, even down to the millimeter.
- 3) More strength in woodworking joints, and much lower in cost compared to manual labor.
- 4) Allows less complicated house framing.
- 5) New house framing designs offer affordable wooden houses for the middle class.

2. Prospects for future business development

1) Current market channels

The "Southern Skill Development Center," authorized by the Champasak Ministry of Labour and Social Welfare, has been chosen as the local base for skill dissemination and

installation of machines for pre-cutting wood. The Center will act as a counterpart for the training of pre-cut system engineers and the marketing of pre-cut building materials. Now with the support of Champasak Province's governor and the Ministry of Labour and Social Welfare, there is potential for the application of the pre-cut mass-production system to public construction projects. These include housing for the displaced from public works projects (e.g., dam construction), natural disaster victims, and veterans. We have also received requests from several companies to collaborate in the construction and marketing of Japanese-style wooden houses.

*"Japanese-style wooden houses" is a term used by locals for houses which are not entirely genuine but has the appearance of traditional Japanese wooden houses. These houses use less structural wood and are lower in cost.

2) Method of marketing

With the pre-cut system, we will provide wooden prefab houses which are in high demand but still lacking in the Laotian housing market. The houses will be marketed with support from government agencies of Laos. Regarding conventional wooden houses aimed for general citizens, model houses will be used to provide marketing know-how to local businesses. Also, we will pursue contracts for ODA projects regarding the construction of local schools and small-scale buildings.

3) Marketing networks

With Japan's franchise-style house marketing system as the model, we will build a sales network in Laos by collaborating with local businesses and supplying pre-cut building materials. This will lay the groundwork for Japanese small and medium sized housing construction companies to expand businesses in Laos, and eventually build a marketing network covering the entire Indochina peninsula.

4) Scope of sales, prospect of demand within market

Future demand for houses in Laos is expected to exceed 20,000 houses per year. The market size will grow to 140 billion yen in Laos alone and 4.24 trillion yen in the entire Indochina peninsula.

The scope of sales in Laos is estimated at approximately 5 billion yen per year, and if we include the surrounding countries as well as Kenya, it is expected to exceed 20 billion yen per year. Backed by Laos's wealth of forest resources, the development of a high value added wooden housing/wood processing industry can increase the competitive power in the market and further boost the estimated scope of sales.

III. Verification of adaptability of the SME's products and technologies to the surveyed country

1) Pre-cutting machinery

A three-day training course, titled "Basic course on the pre-cut system and Japanese wooden buildings," was held at the Southern Skill Development Center from April 2 - 4. The course, attended by 8 Laotians in their 20s, was based on a manual for operating pre-cutting machines. Ambitious participants showed enthusiasm in the lectures and training sessions.

Technical guidance and transfer of technical knowledge

It was verified that with approximately a year of technical training, Laotian trainees who are interested in the pre-cut system and Japanese wooden building techniques can acquire the skills for basic product manufacturing.

Cutting blades for pre-cutting machines

Regardless of the type of wood being used, cutting blades will eventually wear down. It is likely that hardwood, which is popular in Laos, will accelerate the wearing-down process. Slowing down the machines' processing speed is one countermeasure. However, a drastic yet technically feasible solution would be to create new cutting blades with increased durability.

From these reasons, it was concluded that the pre-cut system and its machinery are consistent with the needs in Laos.

2) Model houses

On April 7 (Sun, 3-5pm), a model house tour with questionnaires was held for the middle class. In addition, on April 8 (Mon, 10am-1pm), a traditional "Baci" ceremony which is practiced in Laos culture was held for invited guests. The results of the questionnaire revealed that middle class participants have a profound interest in wooden houses. Baci ceremony guests also had high opinions for its technical design, such as appearance, insulation sheets (unfamiliar in Laos), quality of waterproof/dampproof sheets, smooth movement of doors and sash windows, and well ventilated rooms. The model house tour verified that the pre-cut system and Japanese wooden houses will be well accepted by the Laotian people.

The estimated selling price, calculated from marketing costs, has been confirmed to be consistent with the range of 1) the current market value of homes in Laos and its surrounding areas and 2) the results of the questionnaire for the middle class, verifying that the project will have sufficient profitability.

Also as a new development, the manufacturing of building materials and fittings (e.g., window frames) was found to have the potential to become a strong industry of high value added, "Made-in-Laos" products recognized around the world. It is also likely to contribute to the development of human resources and the wood processing industry in Laos.

For technical training, it is important to start with the basic concepts (such as the function and capacity of buildings), and teach trainees that the whole purpose of the technology is to achieve such functions and capacities. Technical assistance projects require perseverance, continuity, and a

long-term perspective. Judging from the motivation and eagerness shown, we believe that the trainees will be successful in acquiring the necessary skills.

Upon building and managing the model house, we tried out various methods of teaching, such as using illustrations, marking materials, and simplifying the process for easier understanding. But to further promote the wooden housing industry, it is essential to have trained specialists for each task, such as architectural plans, on-site product manufacturing, and general management. To achieve this, it is crucial to train many Laotian instructors that can teach local trainees.

3) Termite control

Pressurized injection of chemicals, a method widely used in Japan, was verified to be the most effective method for termite control.

4) Effective use of unused timber

The quality of pine trees which are abundant in Laos has been confirmed to be sufficient for structural timber. However, as pine trees are not currently sold in the market, and considering the need for logging, lumbering, and pre-cutting, it would be some time before we can secure the amount of resources needed to meet demands. Also, for termite control and export of pre-cut building materials, wood must go through the process of fumigation and pressurized injection of chemicals. Although an old-model fumigation facility is installed in one of the larger sawmills, pressurized chemical injection for termite control is virtually unknown in Laos. To make effective use of unused pine trees in Laos, teaching skills and installing facilities for this procedure is essential.

5) Verification of adaptability of the SME's products and technologies to the surveyed country

Technical training for the people in Laos will take time. However, pre-cut building materials and fittings are in high demand in Laos and its surrounding countries.

With regard to survey results, the project will provide technical assistance to not major housing construction companies but small and medium sized businesses in Laos. And by promoting Japanese-style wooden houses using the franchise system, we aim to improve the skills and increase the income of local SMEs and its lower-income employees.

For this purpose, we will create structural designs for wooden model houses that focus on low-income housing, and offer technical training for local SMEs and their workers at the Southern Skill Development Center. We believe training engineers and promoting the wooden housing industry will contribute to the growth of employment and income for low-income people.

IV. Expected development impact and effect on business development of the proposing SMEs in the surveyed country through proposed ODA projects

1. Expected development impact in the surveyed country through proposed ODA projects

Socio-economical issues in Laos include 1) the effective use, preservation and plantation of forest resources, 2) improvement of housing situations, and 3) development of the wooden housing industry. We will address these development needs by disseminating the following skills and developing human resources:

- 1) Wooden house construction skills using pre-cutting machines
- 2) Termite control skills
- 3) Construction of wooden model houses that provide opportunities to visit and look around
- 4) Development of the wooden housing industry by implementing "5S" (Japanese method of workplace organization)
- 5) Japanese forest management skills for the plantation of trees suited for wooden houses

The following is a list of potential ODA projects that can be formulated in a relatively short period and contribute to the dissemination of the pre-cut system:

- Application of current results: Grant aid, JICA Partnership Programs
 - ~ JICA's grant aid projects for the construction of schools and health facilities.
- Overseas expansion of Japanese municipalities and cooperation with developing countries: JICA Partnership Programs (local government type)
 - ~ Extensive PPP project between Fukui Prefecture and Champasak Province.
- Direct support for this business project: Proposal-type feasibility survey and pilot project for SME businesses, JICA's overseas investment and lending system.

2. Expected effect on business development of the proposing SMEs

One of the most influential long-term effects of this project will be the mass production of new affordable housing, which will improve housing situations of the poor. Future demand for houses in the Southern region of Laos is expected to vastly exceed 500 houses per year. If the business expands to the capital city of Vientiane, or overseas markets such as Thailand and Vietnam, the number can reach up to 1,500 houses per year. Further business expansion to Africa (Kenya), which shares similar issues with Asia regarding low-income housing, will bring the total demand to over 3,000 houses per year.

This will not only become a key (and much-needed) industrial product of Laos, but together with the supporting industries which will be developed alongside, have the potential of growing into one of the leading industries of Laos.

By doing this, we will be able to 1) disseminate Japan's technology of wooden house construction using the pre-cut system, 2) promote termite control skills, 3) develop wooden housing

industries and human resources, and 4) facilitate effective use of Laos's forest resources. Also in the future, we plan to introduce Japan's forest management know-how for the procurement of raw wood. A sustainable cycle will be built to preserve forest resources by planting trees suited for building wooden houses.

Furthermore, with the dissemination of the pre-cut system in Laos, pre-cut building materials can be provided to Japanese housing construction companies planning to expand businesses overseas, contributing to the stimulation of Japanese SMEs as well.

V. Proposals for formulating ODA projects

For formulating ODA projects, we propose the utilization of the following two schemes: 1) "Proposal-type feasibility survey and pilot project for SME businesses" to transfer and disseminate technological skills and formulate business plans, and 2) "Overseas investment and lending system" for commercialization and business promotion.

1. Proposal-type feasibility survey and pilot project for SME businesses

In this survey, we examined the potential for the development of the wooden housing industry in Laos, and demand among the middle class for affordable wooden houses. By holding model house tours, we learned that there is a high demand for wooden houses among many people including the middle class, and that Japanese-style wooden houses are very well accepted in Laos. The survey also revealed that a large supply of low-priced houses for the poor will greatly improve their housing situations. Also, the manufacturing of pre-cut building materials and fittings for wooden houses will contribute to employment growth and increased income for the lower-class, and the development of a value-added wood processing industry in a relatively short period.

As a part of the scheme for supporting SMEs in overseas businesses based on the Japanese supplementary budget for fiscal year 2012 (*), we propose to implement the following surveys/projects in Laos:

() Proposal-based feasibility surveys and pilot projects for competitive products/technologies of SMEs, which are swiftly applicable to the development issues of developing countries.*

- 1) Cooperation with the Southern Skill Development Center in offering training courses on both the pre-cut system and conventional method for wooden house construction, to create jobs and develop the wooden housing industry.
- 2) Creation of structural designs for wooden houses, aimed for the low-income class, to provide homes and improve living conditions of the poor.
- 3) Cooperation with Oji paper Group South Lao Plantation Forest Co., Ltd. to make use of unused wood and utilize and preserve forest resources.
- 4) Manufacturing of pre-cut building materials and fittings to create jobs and increase income, and

industrialization of the underdeveloped wooden housing industry to expand exports of better-quality timber products.

2. Overseas investment and lending system

When commercializing this business after the completion of the feasibility survey/pilot project, we will consider utilizing the "overseas investment and lending system" for facility investments. This includes equipment for mass-producing pre-cut building materials (unique machines manufactured only in Japan and do not exist in Laos) as well as equipment for pressurized injection of chemicals for termite control.

