

Southern Skill Development Center

Summary Report

Lao People's Democratic Republic

Pilot Survey for Disseminating Small and
Medium Enterprises Technologies for Wooden
House Building Materials and Construction
with Pre-cut Machine

March 2015

Japan International Cooperation Agency

Nishino Construction Company

1. BACKGROUND

Lao People's Democratic Republic (hereinafter referred to as "Laos") is a landlocked country bordering with 5 countries (China, Myanmar, Thailand, Cambodia and Vietnam) and its economic development has been sluggish because of the geographical constrain and the effect of past civil war. However, the country recently changed its mindset from "land locked country" to "land linked country", and is trying to find a new way for economic development by improving the connectivity within the region and becoming the regional logistics hub, taking advantage of its geographical location in the center of Indochina.

The Government of Laos raised "sustainable manufacturing of forestry products that contributes to increase household income, national income and foreign currency" and "improving wood processing capacity commensurate with the supply of sustainable timber and contributing to the growth of exports on final products" amongst 8 policy goals in the " Forest Strategy 2020" formulated in 2005 for improving the situation of forest resources utilization, and stressed the necessity to manufacture high value-added products and export them to neighboring and world markets.

It is expected that such development challenges as the effective utilization of abundant forest resources in the country, improvement of living conditions for low income citizens, and advancement of various industries will be solved through the development of wood processing industry.

2. OUTLINE OF THE PILOT SURVEY FOR DISSEMINATING SME'S TECHNOLOGIES

(1) Purpose

The purpose of this pilot survey is to contribute to improve the following development challenges of Laos:

- Development of high value-added wood processing industry
- Improvement of living conditions of low-income citizens
- Effective utilization of forest resources

Nishino Construction Company (hereinafter referred to as "the Company") has been carrying out activities, keeping in mind the business development that will contribute to the industrial development of the country.

Since the Company arrived at Laos in 2012 for the first time, they think over the way of cooperation with Southern Skill Development Center (SSDC). And they divided the overall work plan into 2 periods of "Basic plan (human resource development)" and "Business plan", and have conducted this pilot survey in terms of the "Basic plan" and have considered the dissemination plan to unfold business after the completion of the pilot survey.

(2) Activities

(a) Transfer/dissemination of technology, training of technical experts/creation of new jobs

Utilizing facilities of the counterpart organization (SSDC), technical training program is to be implemented for those selected by SSDC from southern part of the country, workers of small and

medium sized builders, etc.

(b) Utilizing technology for securing strength, setting up the standard of the technology

- Testing the strength in Japan where the test facility is available
- Setting up the standard of cross section depending on span or room layout

(c) Wood procurement and effective utilization of forestry resources

(d) Institutionalization of these technologies for it to become sustainable

(e) Transportation and installation of the facilities

▪ Semi-automated pre-cutting machine owned by the Company has been already set up since the previous feasibility study.

▪ Transporting the machines as below during this pilot survey

- Sawdust collector with bag filter
- Spare parts for sawdust collector
- Briquetting press machine (some spare parts included)
- Transformers for these machines

(3) Information of Product/ Technology to be Provided

(a) Characteristics of the product/technologies:

Wooden house construction technologies with Pre-cut construction method

The method is a unique Japanese technology used to build functional walls for wooden houses that precisely shield the living space to the outside world, which enhances the habitability and comfort level.

(b) Spec of the product/technologies:

Pre-cut construction method

The method is also a unique Japanese technology that can realize precise processing in millimeter of artisan-skill level by the use of a machine. By utilizing this method, the connection between the wooden parts is further stabilized with much lower cost, making it easier to produce residential wooden frames.

(c) Characteristics/advantage of residential wooden frame (segmented wood structural parts)

It is possible to learn the technology by short-term training. The technology does not require any heavy machinery to assemble, and the packaging/transportation of the finished parts can easily be conducted. By utilizing the residential wooden frame, it is possible to construct clean and comfortable wooden houses that fit in the lifestyle of Lao people, which is affordable for the low to medium income citizens.

(4) Counterpart Organization

- Name of organization : Southern Skill Development Center (SSDC)
- School headmaster: Mr. Bounthone Malavong
- Governing agency: Ministry of Labor and Social Welfare, Lao People's Democratic Republic
Bureau of Labor and Social Welfare in Champasack province
- Basic information
Address: Ban Jadsan km1 Pakse District, Champasack Province
Tel: +856-31-260-363
Scale of the school: 12.8ha
Number of facilities: 6 school buildings (it is supposed to be 17 buildings in the future)
Number of staff: 28 (as of February 2014)
Date of foundation: January 28, 2010
Opening of the School: April 2013
- Role of the organization: Build, sustain and develop the skills of works according to the program and rules established by the Ministry of Labor and Social Welfare.

(5) Target Area and Beneficiaries

- Target Area: Champasack province, Secon Province, Lao People's Democratic Republic
- Beneficiaries: The pilot survey is expected to benefit a broad range of people including officials of Department of Labor and Social Welfare, Champasack Province, trainers and trainees of SSDC. Also poverty group within Champasack Province will be beneficiary in near future, when the price of the wooden houses is reduced thanks to this technology.

(6) Duration

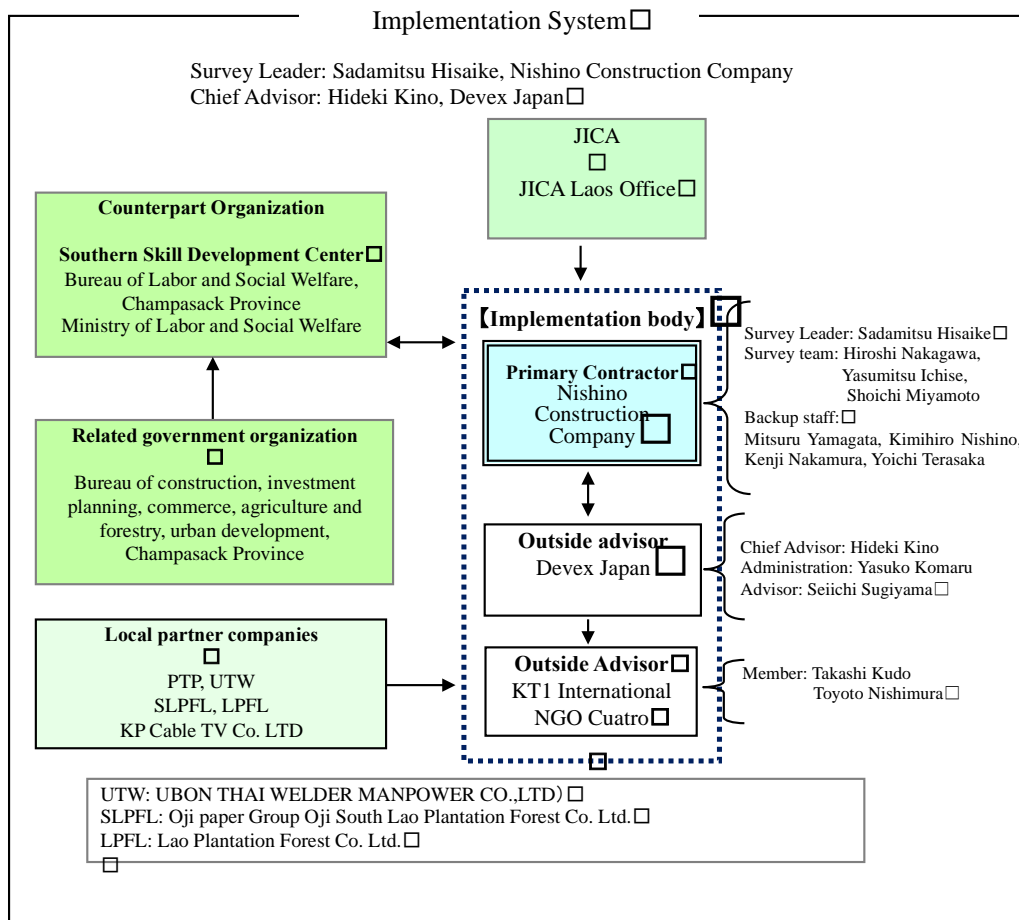
From August 2013 to March 2015

Survey Item	2013						2014												2015
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
1. Advance preparation of the project (Actual meetings on site)																			
1-1	Implementation methods and schedule of the project																		
1-2	Acceptance of machineries and equipment																		
2. Machineries and equipment regarding the project																			
2-1	Packing for export																		
2-2	Inland and external transportation																		
2-3	Preparation for acceptance, installation and test run																		
3. Pre-cut education program for technical guidance																			
3-1	Preparation of draft curriculum																		
3-2	Completion of curriculum (with local partners)																		
3-3	Setting of standard for residential frame																		
3-4	Practical operational training (5S, etc.)																		
3-5	Practical training for Standard and Productivity (5S, etc.)																		
3-6	Production of pre-cut building materials and joinery																		
4. Program for wooden construction technology for technical guidance																			
4-1	Preparation of draft curriculum																		
4-2	Designing of frame																		
4-3	Wooden construction technology																		
4-4	Drawing/Design/Structure																		
4-5	Quantity survey																		
5. Assessment system of technical skills for technical guidance																			
5-1	Certification scheme for technical skill and level of acquirement																		
6. Technology for securing intensity and setting of standard related to the business plan																			
6-1	Intensity test/structural calculation																		
7. Procurement of timber related to the business plan and effective utilization of forest resources																			
7-1	Securement of supply route for timber																		
7-2	Establishment of utilization methods for acicular trees																		
7-3	Consideration of conservation methods for forest resources																		
8. Dissemination of products/technologies related to the business plan																			
8-1	Dissemination activities																		
8-2	Survey for commercialization and formulation of business plan																		

(8) Manning Schedule

Assigned area	Name	Company	2013					2014												2015	Total	MM計			
			Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			Jan	Laos	Japan	
Survey Leader	Sadamitsu Hisaike	Nishino Construction Company	Plan	20		14	14	14			6	14	14	14	14	14	14				152	5.07	0		
			Result	19		8	16	14	10	17	9	12	11	14	11	13				13	11	178	5.93	0	
			Period	8/18~9/5		10/25~11/1	11/10~11/25	12/12~12/25	1/17~1/26	2/24~3/12	3/25~4/2	4/24~5/5	5/26~6/5	6/25~7/8	8/2~8/12	8/23~9/4			11/14~11/26	1/11~1/21					
Production/technology/diffusion	Hiroshi Nakagawa	Nishino Construction Company	Plan				20					14	14								62	2.07	0		
			Result				12															12	0.40	0	
			Period				11/19~11/30																		
Production/technology	Yasumitsu Ichise	Nishino Construction Company	Plan					14													14	0.47	0		
			Result								9										10	19	0.63	0	
			Period								4/24~5/2									9/11~9/20					
Production/technology	Shouchi Miyamoto	Nishino Construction Company	Plan					14													14	0.47	0		
			Result																			0	0.00	0	
			Period																						
Chief Advisor	Hideki Kino	Devex Japan	Plan	20			30			20					30						130	4.33	0		
			Result	20			30		20			16	16			30					28	130	4.33	0	
			Period	8/18~9/6			11/1~11/30		2/20~3/11			5/17~6/1	6/6~6/21			7/16~8/12									
Administration	Yasuko Konaru	Devex Japan	Plan			10						10							15	20	55	0	2.75		
			Result	10	2							41										53	0	2.65	
			Period	Domestic work	Domestic work							Domestic work	Domestic work												
Advisor for forest industry	Seiichi Sugiyama	Devex Japan	Plan				15														15	0.50	0		
			Result				15															15	0.50	0	
			Period				11/1~11/15																		
Advisor for forest industry	From Seiichi Sugiyama to Takashi	Devex Japan	Plan							15											15	0.50	0		
			Result																			15	0.50	0	
			Period																			7/23~8/6(8/11)			
LLC planner of investment fund and audit	Katsuaki Ogawa to Hideki Kino	Grant Thornton Taiyo ASG LLC	Plan				10			10											20	0.67	0		
			Result						11												9	20	0.67	0	
			Period						1/11~1/21												8/13~8/21				
Technical development and guidance	Takashi Kudo	KT1 International	Plan		20		60		60	60	40										240	8.00	0		
			Result		22		60		58	61	40											241	8.03	0	
			Period		9/4~9/25		11/1~12/30		1/8~3/6	3/13~5/12	5/20~6/28														
Local Advisor	Toyoto Nishimura	NGO Cuatro	Plan			60															60	2.00	0		
			Result				40													20	60	2.00	0		
			Period				10/25~12/3													8/23~9/11					
				Plan		Result																Company (Plan)	242	8.1	0
																						Company (Result)	209	7.0	0
																						Outside advisors (Plan)	520	15.50	2.75
																						Outside advisors (Result)	519	15.53	2.65
																						Grand Total (Plan)	762	23.6	2.75
																						Grand Total (Result)	728	22.5	2.65

(9) Implementation System



3. ACHIEVEMENT OF THE SURVEY

(1) Outputs and Outcomes of the Survey

<Technical guidance and education program>

- It became possible by Laotian to manufacture products (furniture, construction materials, etc.), adjust machineries, polish the cutlery and maintain the equipment.
- By the maintenance of educational environment utilizing internet effectively, it became possible to give technical guidance not only on site but also from Japan using internet.

<Technical guidance on method of wooden construction>

- The basic technology transfer of wooden building has been completed through the productions of construction framework and various jigs, and through practical trainings on site.

<Assessment system of technical skills >

- The result of trainers' test confirmed that the technical skills have been acquired by them. And the trainers gave the teaching practice to trainees of SDDC without any problem, which shows that the transmission of skills and techniques has started well.

- It should be emphasized that the safety and worker management manual was utilized proactively in the survey.

<Technology for securing intensity and setting of standard>

- As the result of strength test conducted in Japan, it was confirmed that there is no difference in the basic strength of eucalyptus planted in Laos compared to pine and cypress in Japan.
- Therefore, it enabled the Company to consider the construction method and set the technology for securing strength and its standard, through consultation with the Government of Laos and professional organizations.

<Procurement of timber and effective utilization of forest resources>

- Securement of supply route for timber

In order to contribute to the effective utilization of forest resources and to the model of fostering wood processing industry in Laos, the survey has laid foundation for enabling operation of high yield wood processing industry by reducing the manufacturing cost with technologies and mechanization, using officially approved timbers.

- Utilization of acicular trees

It was confirmed that there is enough pine for high-quality structural materials in Laos, despite the fact that the acicular trees are not utilized effectively. In addition, it was confirmed that the planted eucalyptus wood is used for structural materials, joinery and furniture.

- Preservation of forest resources

The forest of pine in Laos is confirmed to regenerate itself through 100-200 years of cycle. If it is possible to develop a healthy wood processing industry, felling of timbers will be reduced for sure, and forest resources conservation and development of industry will be realized at the same time.

<Survey for commercialization and formulation of business plan>

On January 16, 2015, approval of business plan and the signing ceremony for MOU with 12 attendees from the Champasack province and related organizations were conducted. It was significant that the Ministry of Labor and Social Welfare and related bureaus of Champasack province supported the formulation of the plan, and that the plan was actually formulated jointly by the Government of Laos and the Company.

<Contribution for solving development challenges>

- Improvement of social status of construction workers

The social status of construction workers is low in Laos, and it is common that they are treated as unskilled labors because there are no certifications or assessment systems for technical skills. Based on these background, SSDC had set the income increase of low-income workers by the acquisition of

technical skills as one of its goals and been working on this survey.

As a result, the trainees have been able to acquire technical skills for using machines or for wooden construction, and the Company could lay foundation for improving the social status of construction workers. We will aim to improve their status further by considering the continuous transmission of technology through internet or implementation of technical training in Japan.

- Effective utilization and preservation of forest resources

Regarding the utilization of acicular trees, there is little information including its price as the trees have not been used effectively in the country. Though it may take time to structure stable and appropriate supply route that match with policies of the Lao Government, it will contribute to the effective utilization and conservation of forest resources.

(2) Self-reliant and Continual Activities to be Conducted by Counterpart Organization

Despite the fact that SSDC has been constructed and maintained its facilities with the budget of the Lao government, it needs to run the organization with its own revenue.

SSDC and the Bureau of Labor and Social Welfare regard this survey as the pillar for its autonomous operation and have decided to continue the partnership for implementing business plan with the Company. On January 16, 2015, approval of the business plan and the signing ceremony for MOU between SSDC and the Company were conducted at SSDC.

In order to continue the autonomous activities, it is necessary to formulate a system that can attract and circulate human resources and financial resources. In recruiting talented job trainees (candidates of engineers), SSDC has to maintain the attractive educational environment where they can acquire skills while actually working at the same time. In order to realize the environment, the Company will continue technical guidance on site, and accept the technical trainees from Laos who already acquired certain level of skills at SSDC.

In the local business with SSDC and the Company, high-value added and attractive products will be manufactured and sold at home and abroad, maintain educational environment through the employment of job trainees and technical skill workers.

4. FUTURE PROSPECTS

(1) Impact and Effect on the Concerned Development Issues through Business Development of the Product/ Technology in the Surveyed Country

Potential demand for housing and constructions in Laos and Indochina as a whole is going to be huge in the days ahead, and building and construction rush has already begun. In order to capture the demand largely, such various risks as capital investment also will increase greatly.

The policy of business development agreed in the business plan is to manufacture such wood processing products as pre-cut building material, joinery and furniture, and to sell them at home and abroad. In other words, construction itself is not included in this business. Even though the profit

margin in the unit price is small, building materials and construction of wooden houses using pre-cut construction method will become popular by structuring sales network among contractors and distribution outlets in respective regions.

Construction companies in Laos that have been involved in the survey estimate that the revenue will increase and their business will expand through the shortening of work periods and expansion of construction for standardized houses, by using quality construction materials introduced by Japan. There are also big demands for those products in neighboring Thailand where the residential construction is hitting its peak.

Even though bringing up wood processing industry, improving living conditions of low-income populations and realizing the effective utilization of forest resources take time, it is expected in the medium to long term that they will have huge impact on living conditions of the poor by supplying low-cost housings as a result.

Through the human resource development by the introduction of pre-cut construction method and Japanese wooden construction technology, and also through the development of wood processing industry, industrial foundation that manufacture major industrial products will be maintained in Laos, and also other industries that go into the wood processing industry may be fostered. In that sense, the wood processing industry has hidden potential to become a major industry in the country.

There are also many potential domains where speedy and standardized construction with pre-cut construction method could become predominant: housing for residents who are ordered to move out to alternative locations because of dam construction or mine development, housing for affected people from Typhoon or other disaster, housing for people living in areas with soft ground, housing and public facilities in mountainous areas, etc..

It is further possible in the future that the cycle of forest conservation will be established through the promotion of the effective utilization of forest resources, by implementing afforestation for procuring raw woods suited for wooden house construction under the cooperation with local companies.

(2) Lessons Learned and Recommendation through the Survey

<Lessons>

Activities in Laos by the Company started under the feasibility study funded by the Japanese Foreign Ministry in FY2012, with the purpose of disseminating the manufacturing technology for timber framework by introducing pre-cut construction method, and also the wooden architecture. Through the discussions with various stakeholders on the ground, the feasibility study began looking for an effective way to negotiate with them considering the role and responsibility of each person.

Through that process, we recognized that activities cannot be continued without taking time for discussions, establishing a relationship of trust and sharing each other's purposes.

We have also kept informing the counterpart that we will not pull out of Laos easily and it seems like that the relationship of mutual trust has been built by formulating the business plan jointly with

SSDC.

Contrary to negative information such as indolence of Laotian workers, it was found that it was completely wrong as the project progressed.

It would not have been possible to evaluate people properly and work with them if we had judged them by Japanese standard, because they have different educational background and social environment. Rather than stirring up competition among people living in a social environment with less competition, if we tell them the joy for work or goals for producing things, they respond genuinely.

It is important to tell workers in advance what we want them to do, or assign the roles of each worker when working with other workers. By telling them the importance of cleaning the working place or maintaining tools, and also by declaring that they are not just unskilled labors but working fellows, they are motivated to follow us.

Laotian staffs who are fluent both in Lao and Japanese played an important role in this survey. They understand both the mind of Japanese and Laotian people, and take good care so the both sides can communicate properly. We became keenly aware that the presence or absence of such talent is the key that determines the success of business.

In negotiations with government officials, we always have conveyed our intentions on an equal footing while respecting them. As there were few occasions when the counterparts presented the mutual benefits, risks and responsibilities regarding the contents of the project, as well as the ways of responding troubles, it was necessary to tell them those things and negotiate tenaciously. Furthermore, it sometimes took so much time for schedule adjustment for the consultation with government officials, so it was necessary to take that time into account.

<Recommendation>

In the construction industry of Laos, fostering of the field technicians (craftsman and workers) and supervision engineers (field supervisors or leaders) are urgently needed.

It became clear that the potentials for market growth, technology transfer and industrial development are huge. However, there is also a concern that their effect would be less than half and an unfavorable situation may be remained if the speed of technology transfer or industrial growth is not accelerated and the labor market for construction is deprived of by Vietnamese and Chinese workers, and then Laotian workers have to work away from home.

Specifically, it is desirable to conduct professional education and training along the classification of Japanese architectural job types, and integrate those expertizes into comprehensive architectural technology. SSDC became the center for learning pre-cut construction method and the Japanese architectural technology through this survey, but it is necessary to expand the education for other job types related to construction in the future.

On the other hand, Laotians who studied in Japan in the area of construction and civil engineering have keenly felt that the technology they learned in Japan cannot be directly applied on site in Laos,

cannot rise to business opportunities, and cannot lead to the improvement of technical capabilities on site.

In Japan, supervision engineers in the field have been aging and young people who should learn the technology have been depleted because of the decrease of orders for wooden construction.

As there are many young people in Laos who want to learn these technologies and less people in Japan who want to do so, both markets could be mutually activated if they are linked properly and cooperate together.

In addition, even if there is no place for Japanese young people to use technical skill in Japan, they may go overseas. Laotian youth can make use of the technical skills they learned in Japan after going back to the country, in the scene of the industrial development, whereas Japanese young people can accumulate their experiences overseas with those skills and succeed to the next generation as the Japanese skills.

Though it is not easy to tackle the problem by the Company alone, the Japanese government and the construction industry as a whole can and should do so from the viewpoint of protecting forest resources in Laos.

In coming across occasionally or observing building sites over the past 2 years in Laos, we have noticed that there are many rooms to reduce risks or dangers for the buildings there. Even though the role of construction is to protect people's life and property, there are potential risks of being suffered from natural disasters (typhoon, etc.) or of having accidents caused by construction defect or insufficient management possible to occur when the demand for construction exceeds its supply. We believe that this is a problem that has to be dealt with promptly apart from the politics or laws of Laos.

ATTACHMENT: OUTLINE OF THE SURVEY

THE PILOT SURVEY FOR DISSEMINATING SME'S TECHNOLOGIES
Wooden House Building Materials and Construction with Pre-cut Machine (Lao People's Democratic Republic)

Outline of the Survey

- Proposed by : Nishino Construction Company, Fukui prefecture, Japan
- Counterpart Organization : Southern Skill Development Centre (SSDC)
- Target area and Beneficiaries : (Area) Champasack province, Secon Province. (Beneficiaries) Officials of Dept. of Labor and Social Welfare, Champasack Province and poverty group within Champasack Province.
- Duration : August 2013 – December 2014

● **Concerned Development Issues in Laos** ● ← **match** → ● **Proposed Products / Technologies** ●

● **Development of wood processing industry**

Wood processing/wooden house construction industry has not been developed because of the lack of technologies for processing wood and constructing wooden houses

● **Effective usage, preservation and planting of forest resources**

There are lots of unused coniferous forest resources felled for hydro power generation or mineral resource development. There are also losses in lumber or processing process because of the low level of processing technology.

● **Improvement of living environment for low income population**

Many low to middle income people have to live in houses made by bricks or concrete that are unsuitable for the climate of Lao PDR, because of the delay of the introduction of wooden house construction technology.

● **Pre-cut construction method, etc.**

Wooden building technologies unique to Japan, having the machine implement artisan skill speedily. It can improve the habitability and amenity by opening up and separating living space and outside at the same time.

● **Knowledge on forestry management and wood processing technology**

Knowledge and technology for planting and managing raw wood. Reduction of wood processing losses.

● **Wooden house construction technology for low income population**

Knowledge and technology for developing such wood processing products as construction materials or joinery that are necessary for constructing economical wooden house.

Readiness of proposed company

- It confirmed the compatibility of pre-cut-construction method and the needs for wooden housing through feasibility study funded by MOFA in 2012.
- Through the study, it has cultivated good relations with Champasack province and received strong request for further business deployment from them.

Implemented Activities in the Survey

- Transfer of wood processing/house construction technologies using pre-cutting machines, personnel training
- Develop/upgrade wood processing/house construction industry by introducing "5S" education.
- Introduce management/processing skills for planting/managing raw wood and reducing wood processing losses.
- Develop wooden house and processed products (construction materials, joinery) affordable for low income citizens.

Business Development

- It plans to accept orders for wooden houses or wood processing products in Laos and from neighboring countries.

