Crafting out of poverty

VALUE CHAIN STUDY FOR LACQUER WARE
IN TAM NONG DISTRICT, PHU THO, VIET NAM

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PREFACE

This value chain study is prepared by the International Trade Centre (ITC) within the context of the joint programme entitled ‘Green Production and Trade to Increase Income and Employment Opportunities for the Rural Poor’.

Viet Nam has achieved impressive economic progress since the doi moi (renovation) process was launched in 1986. Since 1993, real GDP growth has averaged 7.5% per year and the poverty rate has been reduced from 58% in 1993 to 13% in 2008. Growth has been driven by accelerated international integration, market liberalization and job creation in the private sector. However, persistent inequalities and poverty remain, particularly in rural areas where more than 90% of the poor reside. In many areas, the income generated from farming is not sufficient for smallholder farmers to reach an income level above the national poverty line of VND 200,000 per capita/per month.

Against this background, the joint programme works to increase income and employment opportunities for raw craft material growers/collectors and grassroots handicrafts and furniture producers. The collection and processing of natural raw materials from forest areas and handicraft production constitute the most important sources of additional income for rural households. In fact, it is very often the additional income generated from handicraft production or the collection of raw material that determine whether rural households can lead a life above the national poverty line.

The programme targets about 4,800 poor farming and craft-producing households in four northern provinces of Viet Nam: Thanh Hoa, Nghe An, Hoa Binh and Phu Tho. These provinces were selected due to: (i) the high incidence of poverty, especially among ethnic minorities; (ii) the concentration of raw materials and local production of crafts; and (iii) the possibility to build synergies with past and ongoing development activities.

Within the four targeted provinces, the programme will focus on the five following value chains: (i) bamboo/rattan; (ii) sericulture and weaving; (iii) sea grass; (iv) lacquer ware; and (v) handmade paper. The programme’s approach is to develop better integrated, pro-poor, and environmentally sustainable “green” value chains, enabling poor growers, collectors and producers to improve their products and link them to more profitable markets. The complex challenges faced by the five value chains, ranging from sustainable raw material production, entrepreneurial skills development and cleaner production to market linkages and trade information deficits, can best be addressed by a joint programme which combines the core competencies of the relevant UN agencies: UNIDO, FAO, ILO, UNCTAD and ITC.

The authors would like to thank Mr. Ngoc Le Ba, Vice Chairman of the national handicraft exporters association VIETCRAFT for his advice and guidance during the preparation of the report. Lastly, the authors would like to thank all sector stakeholders, including farmers, household craft producers, companies, and officials in Phu Tho province for making their time available to the study team and openly sharing their knowledge and views.

The joint programme is funded under the Thematic Window ‘Development and the Private Sector’ of the MDG Achievement Fund. The ‘Development and the Private Sector’ Window seeks “to facilitate the achievement of the MDGs through interventions that promote the development of private sector, through enabling policy frameworks, the growth of inclusive markets and the establishment of pro-poor public-private partnerships that create and sustain decent and productive employment.”

For further details on the present study, please contact Mr. Koen Oosterom, Senior Technical Adviser, at: pmu@greentrade.org.vn or oosterom@intracen.org.
LIST OF ABBREVIATIONS AND ACRONYMS

DARD  Department of Agriculture and Rural Development
DOIT  Department of Industry and Trade
FAO   Food and Agriculture Organization
GDP   Gross Domestic Product
GSO   General Statistic Office
GTZ   German Technical Cooperation
HRPC  Vietnam Handicraft Research and Promotion Centre
ILO   International Labour Organization
ITC   International Trade Centre
JP    Joint Programme
JICA  Japan International Cooperation Agency
UN    United Nations
UNIDO United Nations Industrial Development Organization
UNCTAD United Nations Conference on Trade and Development
VIETCRAFT Viet Nam Handicraft Exporters Association
VND   Vietnamese Dong
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I. INTRODUCTION

I.1 Description of Programme Intervention Areas

The programme is implemented in four provinces in the North of Viet Nam: Thanh Hoa, Nghe An, Hoa Binh and Phu Tho. These provinces were selected due to: (i) the high incidence of poverty, especially among ethnic minorities; (ii) the concentration of raw materials and local production of crafts; and (iii) the possibility to build synergies with past and ongoing development activities.

Phu Tho is a mountainous midland province situated at 80 km northwest of Hanoi, and encompassed by Vinh Phuc and Hanoi to the East, Son La province to the West, Hoa Binh province to the South, and Yen Bai and Tuyen Quang provinces to the North. The province has fairly advantageous transport conditions: With the pass-by of three great rivers: Hong river, Lo river and Da river; with Hanoi-Lao Cai-Con Minh railway route; and inland travel on National highway No. 2 and Asian highway which bridges China to Viet Nam and ASEAN member countries.

Nghe An is located at the heart of Northern Central region, on the North-South transport route and Asian East-West corridor. It is 300 km south of Hanoi. Following the Road No. 8, it is 80 km from the Viet Nam-Laos border and about 300 km from the Laos-Thai border. Nghe An is integrated into all types of national transport: Inland road, railway, waterway, airway and seaway. Having 419 km length of land border and 82 km coast, the province also has Vinh airport, Cua Lo port, and the entire infrastructure under improvement, extension and new construction.

Hoa Binh was re-established in October 1991, sharing border with Hanoi and being the cross-section amongst Northwestern provinces, Red river delta and the economic hub triangle Hanoi-Hai Phong-Quang Ninh on the inland transport with the road network (National road No. 6, Ho Chi Minh trail, National road 12B, National road 15) and river transport (on Da and Boi rivers).

Thanh Hoa is the northernmost province of the Central region, at 150 km south of Hanoi, 1,560 km north of Ho Chi Minh City. It shares borders with Son La, Hoa Binh, Ninh Binh to the North, Nghe An province to the South, Hua Phan of Lao PDR to the West and North gulf to the East. The province has good access to the transport network through the North-South railway, Ho Chi Minh trail, national roads: 1A, 10, 45, 47, and 217; Nghi Son deep port and river system which eases the North-South waterway transport within province as well as to the Central region and international transport. Currently,
Thanh Hoa has built Sao Vang airport and is planning to build another international airport nearby the sea to serve the Nghi Son economic zone and tourism demand.

I.2 Major Socio-economic Statistics

According to the most recent figures presented in Table 1, the average GDP per capita in 2008 in all four provinces was lower than the national level of 17,180,000 VND. Of the four provinces, Phu Tho has the lowest GDP per capita. The statistics also show that the percentage of poor households in the four provinces is higher than the country’s average level of 13% in 2008 (based on the national standard for poor household regulated by the Decision 179/2005/QD-TTg dated 08/07/2005, for which households living in rural areas with equal or less than 200,000 VND/per capita/month are considered poor households).

Table 1: Population size and poverty rate by the year 2008

<table>
<thead>
<tr>
<th>Provinces</th>
<th>Population</th>
<th>No of households</th>
<th>GDP per capita (VND)</th>
<th>% of poor households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phu Tho Province</td>
<td>1,364,522</td>
<td>274,908</td>
<td>8,842,097</td>
<td>18.41</td>
</tr>
<tr>
<td>Hoa Binh Province</td>
<td>788,274</td>
<td>174,198</td>
<td>13,090,660</td>
<td>19.34</td>
</tr>
<tr>
<td>Thanh Hoa Province</td>
<td>3,405,000</td>
<td>746,428</td>
<td>10,295,558</td>
<td>21.15</td>
</tr>
<tr>
<td>Nghe An Province</td>
<td>2,919,214</td>
<td>758,333</td>
<td>10,490,458</td>
<td>17.54</td>
</tr>
</tbody>
</table>

Source: The 2008 statistical yearbooks of the 4 provinces

I.3 Description of Direct Programme Beneficiaries

In collaboration with the provincial authorities, 4,822 poor farming and crafts producing households have been selected in the four targeted provinces as direct programme beneficiaries. Criteria for selection of direct beneficiaries include poverty, current activity in value chain, women and ethnic minority. The list of the 25 targeted communes is shown in Table 2. These communes belong to 14 different districts in the four provinces. The programme will implement promotion activities in 5 value chains in these 25 communes, with the following grouping of communes: 12 communes in the bamboo and rattan value chain, 8 communes in the sericulture value chain, 2 communes in the sea grass value chain, 2 communes in the lacquer value chain and one commune in the hand-made paper value chain. Of the 25 targeted communes, there are 15 communes undertaking the Phase II of the national programme 135 II.

Table 2: List of targeted districts and communes

<table>
<thead>
<tr>
<th>Province</th>
<th>No.</th>
<th>District</th>
<th>Commune</th>
<th>Under Programme 135</th>
<th>Value chain</th>
<th>Number of beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGHE AN</td>
<td>1</td>
<td>Quy Chau</td>
<td>Chau Tien</td>
<td>Yes</td>
<td>Sericulture</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>Chau Hanh</td>
<td>Yes</td>
<td>Sericulture</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>Chau Thang</td>
<td>Yes</td>
<td>Bamboo/Rattan</td>
<td>150</td>
</tr>
</tbody>
</table>
It is worthwhile noting that 41% of the selected direct beneficiaries are considered as poor, in accordance with the official national poverty line of 200,000 VND/per capita/per month. As this percentage is two times higher than the percentages of poor households in the 4 provinces (see table 1), it can be concluded that the programme is indeed pro-poor. In addition, 1,432 beneficiaries from ethnic minorities have been included in the list of beneficiaries, representing Thai, Muong and H’Mong. Handicraft production also strengthens the economic position of women, who are involved in many stages of handicraft production in the five different value chains.

### I.4 Scope and Coverage of the Study

Contributing towards the realization of JP Outcome 1: “Improved understanding of the handicrafts and small furniture value chains in four provinces”, five value chain studies are prepared, one for each value chain identified for the programme: (i) bamboo/rattan; (ii) sericulture and weaving; (iii) sea grass; (iv) lacquer ware; and (v) handmade paper.

The present value chain study covers the lacquer value chain and includes:

<table>
<thead>
<tr>
<th>Province</th>
<th>No.</th>
<th>District</th>
<th>Commune</th>
<th>Under Programme 135</th>
<th>Value chain</th>
<th>Number of beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>THANH HOA</td>
<td>2</td>
<td>Nghia Dan</td>
<td>Nghia Hoi</td>
<td>Yes</td>
<td>Bamboo/Rattan</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Quynh Luu</td>
<td>Quynh Trang</td>
<td>No</td>
<td>Bamboo/Rattan</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Dien Chau</td>
<td>Dien Van</td>
<td>Yes</td>
<td>Bamboo/Rattan</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Yen Thanh</td>
<td>Kim Thanh</td>
<td>Yes</td>
<td>Bamboo/Rattan</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Nhu Thanh</td>
<td>Hai Long</td>
<td>No</td>
<td>Bamboo/Rattan</td>
<td>311</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Nong Cong</td>
<td>Thang Binh</td>
<td>No</td>
<td>Bamboo/Rattan</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Nga Son</td>
<td>Nga Tan</td>
<td>Yes</td>
<td>Sea grass</td>
<td>431</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Thieu Hoa</td>
<td>Thieu Do</td>
<td>No</td>
<td>Sericulture</td>
<td>193</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Luong Son</td>
<td>Lien Son</td>
<td>Yes</td>
<td>Bamboo/Rattan</td>
<td>604</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Tan Lac</td>
<td>Tan Lac</td>
<td>No</td>
<td>Sericulture</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Mai Chau</td>
<td>Na Phon</td>
<td>No</td>
<td>Sericulture</td>
<td>100</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Pa Co</td>
<td>Yes</td>
<td>Sericulture</td>
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<tr>
<td></td>
<td>13</td>
<td>Tam Nong</td>
<td>Tho Van</td>
<td>Yes</td>
<td>Lacquer ware</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Cam Khe</td>
<td>Di Nau</td>
<td>Yes</td>
<td>Lacquer ware</td>
<td>120</td>
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<tr>
<td></td>
<td>15</td>
<td></td>
<td>Tinh Cuong</td>
<td>Yes</td>
<td>Sericulture</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
<td>Yen Tap</td>
<td>Yes</td>
<td>Bamboo/Rattan</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em><strong>TOTAL</strong></em></td>
<td><em><strong>4,822</strong></em></td>
</tr>
</tbody>
</table>
• A presentation of key macro-economic framework data
• An analysis of the main value chain actors from raw material supply to the international market and support organizations at meso level
• An assessment of the strengths and weaknesses of the different actors and income generation along the chain
• An identification of competitive advantages and market opportunities
• The development of an intervention strategy for value chain upgrading and value-addition, with the view to enhance income generation along the respective value chains.
II. MACRO ECONOMIC CONTEXT

II.1 Lacquer Tree Cultivation

The lacquer tree is a tropical industrial tree with a long history in Viet Nam. According to Mr. Do Ngoc Quy, a lacquer tree researcher, the lacquer tree originated from China and then spread to other countries. Currently, one can find lacquer trees in China, Mongolia, Japan, Thailand, Viet Nam, Korea, Myanmar, Laos and in the East of the Himalaya mountains.

The lacquer tree belongs to the family of Anacardiaceae. There are more than 73 general kinds and more than 600 different species of lacquer trees all over the world. Most of them grow in the subtropical regions of Southeast Asia. Only a few kinds of lacquer trees, which grow in the evergreen forests of East Asia, are able to produce lacquer sap. Lacquer sap, called “raw lacquer”, is collected from lacquer trees grown in China and Japan (*Rhus vernicifera*), in Viet Nam (*Rhus succedanea*) and in Thailand (*Melanorrhoea*). The lacquer trees in Donglan of Guangxi Province, China, also belong to *Rhus succedanea* found in Viet Nam and Taiwan and do not belong to *Rhus vernicifer* like most trees of the China mainland. Some differences, however, such as the enzymatic activity and the components of the lacquer, were found between the Donglan lacquer and the Viet Nam lacquer.

In Viet Nam, lacquer trees are cultivated in many provinces in the upland areas of central, coastal and north mountainous regions such as in former Ha Tay, Yen Bai, Tuyen Quang, Ha Giang, Hoa Binh, Cao Bang, Lang Son, Thanh Hoa, Nghe An, Ha Tinh. But the main cultivation area is in Phu Tho, where lacquer trees are cultivated mainly in Tam Nong and some other districts like Thanh Son and Cam Khe. Most of the communes in Tam Nong district plant lacquer trees, but the main cultivation areas are in communes of Di Nau, Tho Van, Hung Non, Co Tiet, Xuan Quang, etc.

Lacquer production has a long history in Phu Tho. In the early 40s, lacquer plantation had been increased from 3,424 ha (1939) to 4,400 ha (1943). From 1945 to the end of the 70s, the lacquer production was up and down and just kept 50% of the cultivation area, while the rest had been converted to cassava production. From 1981-1985, lacquer ware products found their way to Eastern European markets, which helped to increase the lacquer tree cultivation area in Tam Nong up to 900 ha, about twice as large as it is nowadays. From the end of the 80’s to the mid 90’s, lacquer ware products from Viet Nam had lost the Eastern Europe market. Lacquer is since then mainly exported as raw material to China. Due to the fluctuation of the Chinese market, the lacquer plantation area in Phu Tho also varied heavily, which influenced directly the livelihoods of many lacquer growers in Phu Tho.

Today, China is the biggest producer of lacquer liquid and accounts for about 50% of the raw lacquer production worldwide. But Viet Nam still ranks 2nd with 30-35% of the global production. Malaysia, Thailand and other countries share the remaining 15-20%.

Although the Japanese claim that their native product is superior to all others, it is generally recognized that the lacquer from *Rhus succedanea* produced in China and Viet Nam is of the best quality. This also concerns the lacquer from Phu Tho, which is recognized as one of the best quality lacquers in Viet Nam. However, as an analysis of the Viet Nam Handicraft Research and Promotion Center (HRPC) and Heozaemon Company (Japan) found, Phu Tho lacquer resin has higher water and rubber proportion than Chinese and Japanese (Wajima) lacquer.
### II.2 Lacquer Ware Industry

Asians have known about the techniques of using lacquer resin from very early times. The Chinese in the Shang dynasty (1384 - 1111 BC) have used lacquer for decorating simple objects made of bamboo and wood. In Japan, lacquer has been used since the 4th century BC to make daily use products such as crockery or utensils for making tea.

In Viet Nam, lacquer also has a long tradition. More than 2,000 years ago, during the period of the Dong Son culture, the Viet people already knew how to process raw lacquer for making useful things. Many households and cult objects, which were coated with lacquer, have been found from this period. From the 11th to the 14th centuries, in the reigns of the first major royal dynasties (Ly and Tran), lacquer ware handicrafts have been found, although scanty, in archives, cult objects and funerary articles. In the 17th-19th centuries, Vietnamese lacquer work was in bloom, mostly used as religious artifacts: architectural decoration, statues, palanquins, wooden panels, columns etc.

Under the French rule, that traditional art followed the same trend in villages of the Northern Delta (1862-1945). In the first half of the 20th century, the making of objects for secular use (boxes, vases, screen, etc.) prospered in cities and towns. Vietnamese lacquer-work underwent a revival in the 1920s and 1930s, in contact with Western art brought into the country through the Indochina College of Fine Arts founded in 1925. Later on, the Hà Nội School of Lacquer-work was thus set up thanks to efforts of young Vietnamese students of the French college of fine arts. They had discovered the technique of pumiced lacquer and enriched the art’s material, colors, subjects and style. Vietnamese modern lacquer-work is thus an example of national cultural identity. Many villages all over the country are now engaged in lacquer-work.

Today, Vietnamese lacquer ware products are exported to many countries. Phu Tho is a famous province for lacquer trees, but only in terms of raw material production (lacquer resin). There are a few handicraft manufacturers who produce lacquer ware in Phu Tho, but their products are not as well-known as the ones from Ha Tay and other provinces. Final lacquer ware products from Phu Tho are mainly lacquer paintings (with very few designs, such as pictures of Ho Chi Minh, picture of “Happiness – Prosperities – Longevities”, picture of King Hung’s temple etc.) and decoration articles (e.g. boxes, bows, vases etc.).

### II.3 Study Area

The study focuses on the two communes Di Nau and Tho Van, which locate in Tam Nong district. In 2009, the total planted area in Tam Nong district was 496 ha, thereof 320 ha with mature trees under

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**Table 3: Comparing quality of Phu Tho and other country’s lacquer**

<table>
<thead>
<tr>
<th>Origin of lacquer</th>
<th>Water</th>
<th>Laccon</th>
<th>Rubber</th>
<th>Nitrogen</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phu Tho</td>
<td>36.9</td>
<td>44.1</td>
<td>13.5</td>
<td>2.0</td>
<td>96.5</td>
</tr>
<tr>
<td>Chinese</td>
<td>28.1</td>
<td>59.9</td>
<td>5.8</td>
<td>2.2</td>
<td>97.1</td>
</tr>
<tr>
<td>Japanese (Wajima)</td>
<td>20.5</td>
<td>65.8</td>
<td>5.4</td>
<td>1.8</td>
<td>94.5</td>
</tr>
</tbody>
</table>

*Source: HRPC and Heozeamon Company’s study*
harvesting. About half of the lacquer tree cultivation (240 ha) in Tam Nong district belongs to Di Nau and Tho Van.

Total lacquer sap output in Tam Nong was 125.5 tons in 2009. While the planted area and total output more or less tripled since 2000, the yield per ha hardly changed (from 3.5 to 3.9 tons/ha). Lacquer production is a key strategic sector for economic development in the two communes, as also stated in the 2006 lacquer development plan of Tam Nong district.

**Table 4: Lacquer production in Tam Nong district**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cultivation area (ha)</th>
<th>Yield (quintal/ha)</th>
<th>Output (ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Harvestable area</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>149.0</td>
<td>131.5</td>
<td>3.50</td>
</tr>
<tr>
<td>2001</td>
<td>127.1</td>
<td>88.1</td>
<td>3.60</td>
</tr>
<tr>
<td>2002</td>
<td>141.3</td>
<td>86.3</td>
<td>3.70</td>
</tr>
<tr>
<td>2003</td>
<td>161.7</td>
<td>61.9</td>
<td>3.40</td>
</tr>
<tr>
<td>2004</td>
<td>231.2</td>
<td>139.6</td>
<td>3.40</td>
</tr>
<tr>
<td>2005</td>
<td>299.4</td>
<td>178.8</td>
<td>3.50</td>
</tr>
<tr>
<td>2009</td>
<td>496.0</td>
<td>320.0</td>
<td>3.90</td>
</tr>
</tbody>
</table>

*Source: Agriculture Division, Tam Nong district*

**Map: Tam Nong district**

The Di Nau commune has 1,052 households, of which 200 households are engaging in lacquer tree cultivation. Thereof, 42 households are members of the lacquer production association. The lacquer area in the commune has increased from 30 ha 3 years ago to 70 ha recently. The poverty rate in the Di Nau commune is 7.7% (according to the poverty line of VND 200,000/head/month).
Tho Van is also located in the upland area and has a higher poverty ratio (14.7% in 2009). The commune has a total of 835 households, most of which are participating in lacquer production. The lacquer cultivation area was 170 ha in 2009.
III. VALUE CHAIN ANALYSIS

III.1 Lacquer Value Chain Mapping

Lacquer tree cultivation is highly important for household income and employment creation for a large part of the population in the project communes Tho Van and Di Nau. As indicated above, about 200 of the 1052 households in Di Nau and almost 100% of the 835 farm households in Tho Van are lacquer tree growers.

Along the lacquer ware value chain, one can find stakeholders such as seedling suppliers, lacquer tree growers, small lacquer sap collectors, medium-sized lacquer sap collectors, lacquer traders/exporters and lacquer ware producers (e.g. lacquer paintings, lacquer vases etc.). A description of the value chain is given in Figure 1.

**Seedling providers**

There are four seedling suppliers in the two target communes. They simply select the seed of good lacquer trees and then cultivate them to be seedlings. They can provide seedlings to other areas like Phu Ninh district or Thai Nguyen province. The seedling suppliers have sufficient expertise, which allows them to grow up 90% of the seedlings planted, while this ratio is only 50%, if farm households use their own seedlings.

Many wild lacquer trees reach big sizes, up to 20 meters high in some cases, and live a long life, while the lacquer trees found in target communes remain small and last for 5-7 years only. As previous studies suggest, this is mainly caused by the degenerated seedlings of poor quality that are used in the target communes.

**Lacquer tree growers**

There are more than 1,000 lacquer tree growers in the two target communes. They still apply traditional farming practices in lacquer tree cultivation. The total of cultivated areas in Di Nau and Tho Van communes are 70 and 170 ha respectively. This reveals the gradual increase in cultivated areas that has emerged recently. Most growers produce seedlings themselves, while a few get them from the seedling providers.

Lacquer tree farming has become tougher for farmers because of soil degradation. Previously, farmers only had to dig holes, drop seeds into the holes and put ashes down the hole, with fostering being just as simple. Today, they have to do more manual work which includes careful and time consuming land cultivation and seedling care.

Normally the farmers pick the seeds from high-performing red-variety trees for the replanting of trees. However, this is hardly best practice and farmers also seem to plant a mix of different varieties. Some-
times the quality of the trees is affected (hybrids). Some farmers already reported that lacquer trees that did not generate any lacquer.

As a consequence of the soil degradation as well as the traditional farming practices and the non-scientific seedling techniques that are being applied, the trees are small, not exceeding 3 to 4 meters in height, with trunks below 15 centimeter in diameter. They are planted by the end of autumn through September at regular intervals every 2 to 3 meters. A few seeds and some natural fertilizer are deposited together in each small hole, some 10 centimeter deep. The first stems appear in November. A few months later, in April, all the stems from each hole but three are uprooted and by July the last selection is made: only the stronger samplings are left. After one year the trees reach 0.80 meter, after two years some 1.20 meter and after three years or four years, when production starts, they are barely over 2 meter high.

The extraction of lacquer from the lacquer tree is very similar to the extraction of latex from the rubber trees. Like the latex, the lacquer exudes between the bark and the wood and is collected at the tip of V shaped incisions made with sharp blades and renewed at each collecting session. However, a lacquer tree is much less prolific than a rubber tree and the quantity of lacquer collected at one time is very small. The aluminum or ceramic cups which are used for latex are traditionally replaced by half shells of mussels to collect the lacquer. The half shells are nailed into the trunk by their sharpened end. In addition to its convenience and low cost, this natural technology solves the specific problem of preventing the lacquer to touch a metal that would oxidize and spoil it.

The trees are tapped during the whole year. Tapping is done 1-3 times per week, depending of the local practices and on the weather as rain makes the lacquer collection impossible. The less water the lacquer contains, the better it is. 30 to 35% of water content is considered as a maximum, above which the quality drops considerably. The tapping is always practiced before dawn, as the lacquer is very sensitive to sunshine and would otherwise oxidize fast when it slowly dribbles into the mussel shells.

The raw lacquer as it comes from the tree, is whitish, very viscous and flows very slowly. Each tree gives an eye drop of lacquer every time it is cut, 3 to 4 grams as an average, at the peak of its strength. In its entire useful life, it will give no more than about 3 kilograms of lacquer.

Tapping begins when the trees are three years old and continues for five more years, but the first lacquer from young trees contains much water and is of inferior quality, while past the 6th or 7th year, the trees become less and less productive. Seven or eight years old trees must be uprooted and replaced by young ones. All the trees give an abundant supply of small, rounded seeds but usually some trees are grown uniquely as seeds suppliers and are not exploited for lacquer.

In Di Nau, an association of lacquer producers has been set up with 42 members. The members produce lacquer liquid without any pre-processing (the liquid lacquer may have a lot of dust, dry leaves, soil or other solid waste which fall into lacquer liquid after harvest. After harvest, growers sell the lacquer liquid to collectors for cash. The quantity of lacquer liquid produced by one household per day is very small, only 0.5 to 0.7kg. No contracts between growers and collectors have been found in this value chain.
As a matter of fact, raw lacquer is extremely allergenic. It is said that some people are so sensitive that they show allergic reactions just by passing a lacquer tree (in popular language, lacquer allergy is called “being eaten by lacquer”). However, after being filtered and “stir-cooked” the lacquer becomes practically harmless. Only those people who are particularly responsive to allergies may still react if they do not take minimum precautions.

Currently, lacquer trees are cultivated as mono crop in hilly areas. There is hardly any inter-cropping model found in the lacquer tree plantation areas. According to research undertaken by Mr. Thang
(Former Head of Agriculture division of Tam Nong district), it is possible to cultivate lacquer trees in inter-cropping with other cash crops. Inter-cropping can increase the farming incomes of lacquer growers and help to protect the surface soil of hilly areas.

**Lacquer collectors**

There are about 30 permanent and about hundred part-time collectors in the two target communes. There are various types of lacquer liquid collectors by scale and nature of business and financial arrangements. In Tho Van and Di Nau, the household business type prevails. A part of the lacquer liquid is channeled through smaller size collectors to larger scale collectors.

Smallest size collectors are often active in a few areas only, buying lacquer liquid from farm households, reselling to larger collectors and getting paid immediately. They do not have substantial amounts of capital so they can neither buy large quantities nor store the products for later selling. Thus, they buy small quantities of 0.5 kg to 5 or 7 kg and sell the accumulated amount to large size collectors.

Large size collectors, buying either directly from growers or via small size collectors, will then proceed with simple manual refining (see detail in Box 1) and categorizing lacquer liquid. The output will be refined lacquer liquid in different concentrations of lacquer. However, advanced techniques of lacquer measuring have so far been applied in the target communes except for burning lacquer to scale the remainders after burning.

**Box 1: Pre-processing lacquer**

Once the lacquer is collected, it is left undisturbed over a period of 6 -12 months in natural condition in special round-bottomed lacquered bamboo baskets, again to prevent any contact with metal, carefully topped with oil and lacquer impregnated paper cover. During this time the lacquer slowly settles and segregates into several distinct layers as follow:

- The “Mat Giau lacquer” is the true soul of the lacquer. It is the best lacquer and it is used and processed other different ones.
- The “Gioi lacquer” which is the proper good quality lacquer and consists of two sub layers: “Son Nhat” and “Son Nhi”. Son Nhat and Son Nhi differ mostly by their water content (Son Nhat is yellowish, Son Nhi is almost colourless).
- The “Son Thit” is solid and white and has the lowest rate of oil surface.
- The “Nuoc Thiec” is aqueous product of the lowest quality, which the Vietnamese mixed with sawdust to make good thick putty.

People can make many different lacquers from the above lacquers according to using aims. There are many ways to process the lacquer such as mix, filter and “stir-cooked”.
The collectors, then, will transport the refined lacquer sap to the border province, (e.g. Quang Ninh) to sell to Chinese importers. In some cases, Vietnamese exporters who locate outside Phu Tho province can buy lacquer from collectors and export to China. Lacquer products exported from the two communes are almost in liquid form and only sometimes in pre-processed form.

**Chinese traders**

Most of the lacquer liquid goes to the Chinese market. Chinese importers order the volume of lacquer liquid needed from the traders/collectors. The Chinese importer will take over all the trading procedures with the Vietnamese customs office to import the lacquer liquid.

There are 3 types of Chinese traders: Some are living in the communes, others in Quang Ninh province and other ones in China. All of these traders are middlemen. The ones in China will sell the lacquer to the Chinese processing factory.

Chinese traders also negotiate the buying price on the basis of lacquer concentration. They apply a simple method to determine the concentration. The Chinese trader takes a simple weighing device (probably not very precise) with a small 10 gram weight on one end. He then puts the same weight of lacquer sap on the other end. He consequently puts a flame underneath to evaporate the water to end up with concentrated lacquer. He then weighs it again, by moving the 10 gram weight towards the middle to re-balance the scale.
The Chinese traders apparently demand 65% concentration in the lacquer sap. However, the percentage of concentration is strongly affected by the weather, soil conditions, variety of lacquer (e.g. red variety), so the traders have many excuses for dumping the price.

**Lacquer ware producers**

There are two types of lacquer ware producers in Phu Tho province. One makes lacquer paintings and the other one makes lacquer paintings and vases. The paintings are almost exclusively designed for the domestic market. The local lacquer ware producers sell to Vietnamese companies (sometimes according to orders based on samples) and to tourists visiting the King Hung temple or to Vietnamese families having anniversaries and other events.

There is one manufacturer in Phu Tho, the company LV-Oriental Pearl, who has its headquarter in Hanoi and other workshops in former Ha Tay province and who exports directly. 100% of the products of LV-Oriental Pearl are for export. LV's factory is in Thanh Ba district in Phu Tho province.

There is poor communication and cooperation between different actors within the lacquer VC. Quality standards or requirements are not shared by the actors along the functions of the value chain so they run the risks of goods being rejected.

The lacquer ware producers in Phu Tho have little know-how on marketing, financial planning, company organization and command of foreign languages etc. Only LV-Oriental Pearl has been able to attract international customers for lacquer ware products, which is mainly due to his participation in international exhibitions (e.g. AMBIENTE in Frankfurt).

In general, lacquer ware producers use a combination of lacquer liquid and processed lacquer for making final lacquer ware articles. While processed lacquer is only used for the final finishing of the product, a larger quantity of lacquer liquid is needed. However, lacquer ware producers in Phu Tho and other provinces currently substitute lacquer liquid by cashew nut oil due to its relatively low price, its registered quality and a better supply reliability (standardized in terms of packaging and easy to order in large quantity). Most important is the much shorter time needed for drying after painting (this information was mainly gathered from the interview of Mr. Do Dinh Lang, Director of the LV-Oriental Pearl Company). The only disadvantage of cashew nut oil is the rather poor durability of color after painting. It was evidenced that the paintings made from cashew nut oil will fade easier than if paintings are based on lacquer oil. Some experts also mentioned that among the most important advantages of using lacquer oil would be that the end products would be more durable and more attractive.

The processed (industrial) lacquer used in addition to cashew nut oil or lacquer liquid is bought from Chinese traders. This processed lacquer from China is made from the same kind of lacquer liquid as the one from Phu Tho (Phu Tho is said to have one of the best quality lacquer liquid worldwide) and is reported to consist of 30-40% of pure natural lacquer liquid and 60-70% industrial additives. The composition of additives is confidential and such industrial lacquer is currently not being produced in Viet Nam. The use of additives allows a faster drying process and makes products more colorful. In addition, additives are reported to be cheaper than the natural lacquer liquid.
Box 2 shows the basic production stages which are needed to make lacquer ware. It requires a long time, hard work and capital.

Painting means polishing and polishing also means painting. As a result, lacquer paintings have a real depth. Moreover, if the artist follows the traditional methods to make lacquer ware, the painting and products will retain their beauty.

Box 2: Production process of lacquer ware

1. Design products
   - Design the shape of the products to suit the materials such as wood, bamboo.

2. Manufacturing the base (cổt vé in Vietnamese)
   - The wood is treated for anti-bacteria purpose then dried to protect the base against shrinkage, cracking, warping. The size of the base is determined at the beginning of the process.
   - The base is covered by pure cotton cloth and coated with lacquer paint then is cured in humid conditions for 3 or 5 days (depending on the climate). It is then taken out for polishing and painted over again.
   - In total each base will have about 10 -15 coats of paint.

3. Drawing
   - The painter prepares a design sketch, using water color, or oil paints.
   - Transferring the design to Lacquer: the painter draw onto the base surface many times, in many stages, using many layers of materials such as eggshell or pearl inlay, gold and silver with certain techniques or styles. After the drawing stage, the product is covered with lacquer paint made from the lacquer tree and left for 7 to 10 days to dry (noted that using cashew nut oil could reduce time of dying to 3 – 5 days only).

4. Polishing
   Use the whetstone and sandpaper to create a smooth surface as well as adjusting the quality of the color (bright, dark, bold). Then, product is covered by thin limpid pain and left 5 to 7 days to dry, polish and gloss.

5. Glossing
   Use carbon powder, hair and cotton to polish by hand. The finished work has a smooth, deep and beautifully shiny surface.

III.2 Economic Analysis of the Value Chain

Lacquer tree cultivation generates reasonable economic value and has comparative advantages in the hilly areas of Phu Tho province. According to data provided by the Agriculture division of Tam Nong district, the average benefit from 1 ha of lacquer plantation is about VND 17.8 million (equivalent to USD 920/year). This is a significant source of income for the farmers in the two target communes with an average income of VND 2.5 million/year only.
But lacquer productivity is very low (average of 230 kg – 320 kg/ha/year), if compared with other countries like China or Korea (550 kg – 650 kg/ha/year). As mentioned earlier, some of the reasons are insufficient investments and the fact that farmers apply non-standardized farming practices.

**Table 5: Economic analysis of 1 hectare of lacquer (production cycle of 6 years)**

<table>
<thead>
<tr>
<th>No</th>
<th>Content</th>
<th>Price (VND)</th>
<th>Productivity (kg)</th>
<th>Estimated revenue (VND)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total revenue in 6 years</td>
<td>110,000</td>
<td>1,560</td>
<td>171,600,000</td>
</tr>
<tr>
<td>2</td>
<td>Total cost in 6 years</td>
<td></td>
<td></td>
<td>64,895,000</td>
</tr>
<tr>
<td>3</td>
<td>Average benefit per year</td>
<td></td>
<td></td>
<td>17,784,167</td>
</tr>
</tbody>
</table>

Source: Agriculture division of Tam Nong district, 2010.

The largest part of the lacquer production in Tam Nong is exported. The value chain, if the end users of lacquer products are included, is quite long with many stages outside of Viet Nam involved. Due to the importance of lacquer liquid in the value chain and the constraints faced in the value chain, lacquer liquid is considered as the final product in one case of the economic analysis. Due to limited data available, value added is calculated for actors up to Viet Nam’s border only. Other types of products marketed in Viet Nam are lacquer ware and handicrafts. For the economic analysis of the distribution of value added along the chain, a lacquer painting is taken because it is a typical product of the district.

**Figure 2: Economic analysis of 1 kg lacquer liquid**
As Figure 2 shows, the by far biggest part of the value is created in China. It is hard to get figures of costs and benefits of the Chinese importers. However, Vietnamese handicraft producers have to import processed lacquer paint from Chinese processors at a price of almost VND 400,000/kg. This clearly shows the disadvantages of Vietnamese stakeholders in processing lacquer liquid. But from another perspective, this implies a huge potential for the lacquer sector of Viet Nam, if one could provide appropriate interventions for upgrading the sector to international level.

In the case of painting pictures for the domestic market, most of the value is created in the stage of making the picture (75%) while all other stages make only 35%. The share is even much higher if the product is exported. It is difficult to estimate the costs and benefits of an exported painting, since the price is determined by many unaccountable factors such as name of author, beauty of picture etc. However, there are only very few handicraft producers in the communes and district, which can sell their products to high end markets in Viet Nam or abroad.

**Figure 3: Economic analysis of 1 painting picture (1.2 * 2.4 m)**

Based on results of surveys and interviews, some major constraints of the lacquer sector in Phu Tho are listed below.
**Input supply constraints**

Seedlings for lacquer trees in Phu Tho are mainly obtained from natural seed growing, whereby growers simply select the seeds of good looking trees and cultivate them to get the seedlings. This has gradually resulted in degeneration of lacquer trees in the region. This situation has reduced quality and productivity of lacquer in the area. Indirectly but significantly, low quality seedlings have increased the cost of input used (e.g. fertilizer and pesticides) of lacquer growers.

It is also recorded that farming practices of some lacquer growers have been improved, followed by a productivity increase in general, but most of the farmers still apply traditional farming practices with rain-fed system, insufficient use of fertilizer, lack of farm management (e.g. cutting branch, inter cropping with other crops, weeding etc.).

**Box 3: Degeneration of lacquer trees**

Mr. Ha Van Tan, farmer of Tho Van commune said that he has experience of planting lacquer trees since the 1980’s before the collapse of the Union of Soviet Socialist Republics (USSR). He is worried about the degeneration of lacquer trees. He remembered that in the 90’s, the diameter of a lacquer tree was 20 cm, which is only less than 15 cm nowadays. The height of lacquer tree is larger now, but according to his experience, taller lacquer trees provide less lacquer liquid per harvest.

Many other farmers in the two target communes, who had been interviewed, also reported the same situation.

**Market access constraints**

Farmers are mainly selling liquid lacquer as raw material without any pre-processing activity. The selling price is negotiable but mainly set up by the buyers, who are either small or large scale collectors. The price also is determined by the quality of lacquer liquid. However, no standard quality testing device is available in the area. Thus, the collectors are able to dump the price as much as they can by setting the quality of lacquer liquid. None of formal contract between grower and collector or trader has been found in the area.

The weak linkages between farmers and traders/collectors go along with little market information being available along the value chain. Information on quality requirements and standards applied to meet buyer demand, or options to select buyers etc., are not available. From this results an increase in transaction cost for all the stakeholders, and growers, as usual, have to bear the highest cost.

Lacquer liquid is sold in plastic bags, which are damageable and inconvenient for transportation. It is also impossible to trace the origin of lacquer liquid to ensure consistent quality.

The supply system of lacquer ware, as described in the value chain analysis, is scattered and characterized by individual collectors and different geographical locations. Due to reported cases of mixing up sugar, edible oil and even, machine oil with lacquer liquid in the last few years, lacquer ware producers have become reluctant to purchase lacquer liquid.
When liquid lacquer is exported to China, Chinese importers buy from traders/collectors. The buying relationship between Chinese importers and Vietnamese traders/collectors is mainly based on personal connections. The Chinese importers will only pay the Vietnamese traders after they have received the products and inspected the quality of the lacquer liquid. As payment is usually made in Chinese currency, Vietnamese traders bear the risk of exchange rate fluctuations between selling and receiving the payment. And finally, the loss incurred by traders/collectors will be completely passed down to the growers, who, being at the end of the value chain, always lack of bargaining power.

Other types of market access constraints are reported between lacquer ware producers and traders. Lacquer ware producers in Phu Tho province face difficulties in developing their business, due to monotonous product designs, a limited number of buyer contacts or high marketing costs.

**Technology and product development constraints**

The tools used for lacquer harvesting are very simple. Farmers use a simple knife (Picture 4) or shell of clam for cutting and keeping lacquer liquid (Picture 5).
Using a simple knife for tapping can cause a loss of productivity or even death of the tree, if the cutting is done too deeply, especially in case of an inexperienced harvester. Meanwhile, a not deep enough tapping can reduce productivity as lacquer liquid may not run out as much as it would do if tapping would be applied correctly. Further on, in many discussions, farmers have raised concerns about a shortage of natural clam shells. Another reason for concern is the fact that a shell can only be used about 10 times for harvesting without creating loss due to leakages and damages.

The introduction of Kitafon, a chemical substance, which can help to harvest more liquid per tapping (particularly in case of older trees) is also a considerable technical solution. But there is still lack of scientific knowledge regarding the question to what extent the use of Kitafon affects the quality of lacquer liquid and the lifespan of lacquer trees.

There is no inter-cropping system applied in the target communes. Applying inter-cropping systems appropriately (e.g. techniques, types of crop, potential of market demand etc.) can enable lacquer growers to increase their income, while at the same time the soil can be protected from erosion.

By-products, such as those emerging from the processing of seeds, are currently not being used. As experience from other countries like China, Korea or Japan suggests, lacquer by-products can present a significant source of income for growers selling seeds, processors selling processed by-products and traders diversifying their products.

The most problematic technology constraint is the lack of know-how on lacquer processing. As mentioned above, most of the lacquer of Phu Tho (and Viet Nam in general) is traded as raw material and therefore, very low value addition takes place in the country. The processed lacquer, which is re-imported by Vietnamese lacquer ware producers, has a price which is three times higher than lacquer liquid sold by growers. Finding a solution to this constraint by developing appropriate techniques to process lacquer liquid would be a key factor to upgrade the lacquer value chain in Viet Nam.

Another critical constraint is the low level of design innovation. Producers lack the capacity to design new lacquer ware products, which is why very few products of Phu Tho lacquer ware can meet the demand of high value markets in large cities like Ha Noi and Ho Chi Minh City or abroad.

**Organization and management constraints**

It has been recognized that many actors involved in lacquer trading lack capacities in business management and foreign trade knowledge. This limits the opportunities of lacquer ware trading companies and cooperatives to access potential markets abroad. The lacquer association in Di Nau commune could be more active in supporting and training members in these aspects.

**Financial constraints**

Due to the very high demand for lacquer liquid that occurred this year, all actors in the value chain are keen to invest in the lacquer sector. However, when interviewed, stakeholders also reported to be
short of the capital that would be needed to up-scale production and business.

Figure 4 below summarizes some of the major constraints in the lacquer ware value chain in Phu Tho.

**Figure 4: Constraints at micro level**

III.4 Socio-economic Parameters (Gender, Work and Labour Standards)

In lacquer growing households, women are the main labor force, undertaking the most time-consuming and most regular work - tapping (harvesting) lacquer liquid. The women have to go to the field at 2:30–3:00 a.m., so that all trees are tapped and lacquer is harvested before sunrise. Men mainly do work during day-time, such as planting lacquer trees, rice and other crops, as well as pursuing other non-farm activities. This is considered as an appropriate labor force allocation, as, except for the early working hours, lacquer liquid harvesting is considered gentle work. Cultivation of lacquer trees in Tam Nong does not involve child labor in any activity along the value chain.

As mentioned above, the tools applied for lacquer harvesting are very simple. None of the women harvesting lacquer liquid use protective clothes, which is a problem, as lacquer liquid can cause skin allergy. To avoid this, it is necessary to improve skin protection (e.g. gloves or safety clothes), which can help to protect women from skin allergy.
III.5 Environmental Concerns

There is an environmental concern arising from the plastic bags that are used by the seedling providers for wrapping the soil bag of the seedlings. When planting seedlings, all bags are discarded freely in the field without any proper disposal treatment. In the long term, if this solid waste is not properly treated, the accumulated waste may create environmental problems for the area.

Currently, most lacquer growers are using fertilizers and pesticides in quantities that are not sufficient for plant protection. This has negatively affected farmers’ productivity.

Lacquer ware production can harm the environment by water pollution. Producing lacquer ware needs a lot of fresh water, especially for polishing the coated frame and finalizing the lacquer painting. As the survey results shows, no water disposal treatment is being applied by the interviewed lacquer producers in Phu Tho.

As far as the water environment is concerned, lacquer and silver carving villages produce the most pollution. The water comprises high concentrations of pollutants. In the lacquer villages of Ha Tay, the Chemical Oxygen Demand (COD), the Biochemical Oxygen Demand (BOD) and Suspended Solids (SS) contents are 1.8 to 3.5 times higher than the allowed level.

Box 4: Water disposal of lacquer ware
Mr. Le Ngoc Xuan, head of Tam Son lacquer ware manufacture in Tho Van commune, said that he tried to breed a duck flock in the pond behind the lacquer ware manufacture last year. After a short period of time, all of duck had died with symptoms of being poisoned. The ducks of the neighboring family, which were also using the same pond, died with the same symptoms. After that, the lacquer ware producer experienced that the ducks only stay alive if he keeps them far from the pond, where they dispose the water used for lacquer ware production.

III.6 Meso Level Support Institutions and other Projects

Lacquer is being considered as one of the strategic sectors to improve the rural economy and to reduce the poverty rate in upland areas of Phu Tho. A master plan of lacquer development towards 2010 has been approved by the leaders of Phu Tho province and Tam Nong district in 2006, which contributed significantly to the development of the lacquer sector as well as to enhancing living standards of many households in Tam Nong district.

The master plan focuses not only on technical aspects of lacquer plantation, but also on the socio-economic impact of all economic activities undertaken in the lacquer sector (by service providers, traders and processors). However, due to the fact that the government budget is limited and that there is no adequate mechanism to facilitate collaboration on investment of the private sector, many difficulties still exist in the lacquer sector.
Currently, Phu Tho’s Department of Agriculture and Rural development (DARD), Sub-Department of Cooperative and Rural Development, People Committee of Tam Nong district, Division of Agriculture of Tam Nong district, Di Nau and Tho Van commune’s officers, etc. are all actively supporting the promotion of the lacquer value chain.

**Figure 5: Critical Points at Meso level Support Institutions**

- **Seedling providers**
- **Growers**
- **Collectors/Pre-processor**
- **Lacquer ware producers**
- **Handicraft producers**

District Lacquer production Associations:
- Introduction of standard seedling
- Pilot models of lacquer plantation
- Master plan for lacquer sector
- Pilot models of lacquer plantation

Provincial Trade promotion centre:
- Lack of techniques in lacquer liquid processing
- Lack of cooperation among members
- Lack of support to link growers to other stakeholders along the value chain
- Lack of support and guidelines for int'l trade
- Lack of activities for trade promotion

DARD, DOT, District authorities and Agencies:
- Lack of support and guidelines for int'l trade
- Lack of activities for trade promotion
- Lack training on business management
- Lack of strategy for handicraft development
IV. VALUE CHAIN UPGRADING STRATEGY

IV.1 Market Opportunities and Competitive Advantage

Demand of lacquer liquid from the Chinese market has been increasing since last year. According to Mr. Thang, former head of the Agriculture Division of Tam Nong district, who led the team preparing the lacquer development plan in 2006, the total capacity of lacquer liquid production in Tam Nong is about 130-150 tons/year, which is currently mostly exported to China in form of raw lacquer liquid. As a result, lacquer tree farmers are highly dependent on fluctuations on the Chinese market, and the unstable market conditions do not encourage people to expand lacquer production.

In order to overcome these market constraints, three major opportunities can be exploited:

1. **Short-term opportunity:** Currently, only less than 10% of total production (10-12 tons) of lacquer liquid is used for domestic lacquer ware production. It is expected that, about 45-47 tons (32-37% of the current production capacity) could be traded domestically, in case that the lacquer liquid is used by the lacquer ware producers in the province and neighboring provinces to replace cashew nut oil. Lacquer ware producers confirm to be prepared to substitute the cashew nut oil by the higher quality lacquer liquid if a stable supply can be organized/guaranteed within a price range of about VND 90,000-100,000 per kg (the current average price per kg of lacquer liquid sold by small scale collectors is estimated at VND 115,000 per kg).

   The main constraint is the unstable supply of lacquer liquid, as collectors only prefer to supply local lacquer ware producers at times of low Chinese demand, but at other times speculate on obtaining higher prices in China (large-scale collectors recently reported a price of VND 130,000 kg). A win-win-situation that would suit both sides would be for the sellers to sell lacquer liquid under stable market conditions to Chinese buyers at a reasonable price, or a strategy, where part of the production is sold regularly on the domestic market at a guaranteed, stable price while another part is kept by the sellers until other (temporary) market chances offer themselves. It is recommended that the project assesses the feasibility of setting up more formal and reliable lacquer liquid supply relations within the province. This particularly includes an analysis of the interests of lacquer liquid suppliers and buyers in more detail, in order to bargain an agreement that is convenient for both parts.

   If cashew nut oil can be successfully substituted at provincial level, further multiplication can be endeavored at national level.

2. **Short-term opportunity:** There is currently only one lacquer ware producer in the province, who is competitive on the international market. Two other producer groups work successfully on the national market. However, although the lacquer ware producers are recognized for their quality, the uniformity of the products, be it of local lacquer ware paintings or of products presented at international trade fairs, presents a major constraint for further market development. Capacity building involving design development, innovation, development of new con-
temporary product collections, marketing and branding initiatives can boost the development of the existing lacquer ware producers.

3. **Long-term opportunity:** The major long-term opportunity that presents itself for the domestic lacquer industry is the production of processed (industrial) lacquer according to international standards. As the price of processed lacquer re-imported from China is 300% higher than the price of semi-processed lacquer in Viet Nam (VND 400,000/kg compared to VND 128,000/kg, see value added calculation), upgrading of lacquer liquid processing would markedly enhance the competitiveness of the lacquer industry with a market income increase to be expected for local lacquer tree farmers. In order to facilitate the upgrading strategy, the available technologies for the required investment have to be assessed in detail.

**Box 5: Discussion with Mr. Do Dinh Lang, Director of the LV & Oriental Pearl Co. Ltd**

He informed that his company currently purchases about 35 tons of cashew nut oil for lacquer ware production. He knows that lacquer is better and more durable than cashew nut oil in producing lacquer ware. If the price of lacquer liquid is varying from VND 90,000 to 100,000/kg, it is reasonable for purchasing, since 1 kg of lacquer liquid is equivalent to 4-6 kg of cashew nut oil to produce lacquer ware and the price of cashew nut oil is VND 20 – 25,000/kg currently.

Mr. Lang said that, if lacquer liquid can be supply consistently in term of quality and quantity, he would rather prefer to use lacquer liquid than cashew nut oil for making the core and coating the frame of lacquer ware.

He also emphasized that a lacquer ware producer like him has to import processed lacquer from China (Hong Kong) with a 3 times higher price than lacquer liquid in Viet Nam to coat the surface of the final product. The processed lacquer cannot be produced in Viet Nam nowadays, Mr. Lang said.

**IV.2 SWOT Analysis**

Strengths, weaknesses, opportunities and threats of the Phu Tho lacquer sector will be discussed in the following matrix.

**Table 6: SWOT analysis**

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lacquer trees have been planted for a long time in the district, so the growers are experienced in cultivation; • The soil and weather conditions are favorable for lacquer tree cultivation; • Previous studies have given evidence of high quality of lacquer sap in Tam Nong; • Lacquer trees grow in upland and hilly areas, so it</td>
<td>• Lack of high quality seedlings; • Degeneration of lacquer trees (smaller diameter of trees, less lacquer liquid productivity); • Lack of standardized lacquer tree plantation practices; • Small-scale production at household level; • Tho Van and Di Nau communes in Tam Nong district have high poverty rates, which have caused</td>
</tr>
</tbody>
</table>
is safe from flooding and does not compete with other low land crops;
- Lacquer tree cultivation is neither harmful to land quality nor conducive to soil erosion;
- Given the currently high prices of lacquer liquid, growing lacquer trees provides a higher income than other crops such as rice, cassava or eucalyptus;
- The personnel at DARD and Tam Nong district has high professional expertise in lacquer plantation and is committed to improving the development of the lacquer sector, especially in seedling improvement and standardization of cultivation techniques;
- The development plan of lacquer in Tam Nong district is in the process of being implemented since 2006;
- There are good transport conditions;
- The workers in the communes and districts are hard-working people;
- Some enterprises with expertise in lacquer paintings and lacquer ware making already exist.

The lack of investment in lacquer tree cultivation (e.g. applying sufficient chemical fertilizers and pesticides);
- There are no intensive cultivation areas (farmers are now applying extensive cultivation technique according to their experience);
- Farmers, collectors and traders sometimes add impurities (e.g. soil, sugar, edible oil or even mechanic oil) into lacquer to increase weight of lacquer liquid. That threatens the consistent quality of lacquer liquid;
- The budget for lacquer tree research at national and provincial level is limited;
- Lacquer products, both liquid and processed, are unbranded;
- High fluctuation of market price of liquid lacquer;
- Vietnamese traders bear all trading risks in exporting lacquer liquid to China;
- Weak linkages among stakeholders along the value chain;
- Lacquer liquid without any processing is the main product that is currently being traded. Low added value is one of main weaknesses of the lacquer sector in Phu Tho and Viet Nam;
- Poor design capacity for lacquer ware products.

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Losses of lacquer production in China and Korea due to cold weather in 2009-2010;</td>
<td>• High dependence on very few foreign markets, mainly China, so any unpredicted changes on this market can bring chaos to the lacquer production in Tam Nong district;</td>
</tr>
<tr>
<td>• The young Japanese generation dislikes lacquer production and lacquer processing;</td>
<td>• Engagement in low-value products (liquid lacquer and low quality lacquer ware) can, according to value chain theories, result in high substitution and high competitive pressure in the world market;</td>
</tr>
<tr>
<td>• The world demand for lacquer may increase for safe wall-painting products;</td>
<td>• Negative environmental impact of water disposal of lacquer ware production.</td>
</tr>
<tr>
<td>• Both commercial and technical delegates from Japan, South Korea have visited Viet Nam and showed their interest in further research and trading with Phu Tho lacquer;</td>
<td></td>
</tr>
</tbody>
</table>
• Advanced technologies of lacquer processing can be made available with the support of foreign experts;
• International markets for lacquer ware products have high potential if producers can meet the high quality demand;
• The domestic market of lacquer ware products also has potential since the district is close to King Hung Temple tourism point.

### IV.3 Vision

An appropriate vision for upgrading the value chain for lacquer in Tam Nong, Phu Tho, can be proposed as follows:

“The productivity of lacquer tree cultivation is improved and lacquer trading/processing companies and lacquer ware producers have diversified and increased their product range and markets.”

Figure 6 shows the main constraints with regard to achieving the vision and how these can be addressed by different solutions.

**Figure 6: Constraints and advantages related to the proposed vision for lacquer production in Tam Nong**

Intensive farming of the Red lacquer tree can bring much more economic benefits to stakeholders in the lacquer value chain, especially the poor. Lacquer tree growers can increase incomes by: (1) increase lacquer productivity by a factor of 1.55 and (2) expand the harvesting period from 6 to 7 years, with total production in the additional year of about 450 kg/ha. The following tables compare the turnover of 1 ha lacquer that is achieved by traditional farming and by intensive farming respectively.
Table 7: Benefit of 1 ha lacquer applying traditional farming practice

<table>
<thead>
<tr>
<th>No</th>
<th>Items</th>
<th>Unit</th>
<th>Price</th>
<th>Quantity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total gain in 6 years</td>
<td>kg</td>
<td>110,000</td>
<td>1,560</td>
<td>171,600,000</td>
</tr>
<tr>
<td>2</td>
<td>Total cost in 6 years</td>
<td>kg</td>
<td></td>
<td></td>
<td>64,895,000</td>
</tr>
<tr>
<td>3</td>
<td>Lacquer grower’s earnings per year</td>
<td></td>
<td></td>
<td></td>
<td>17,784,167</td>
</tr>
</tbody>
</table>

Source: Calculation based on primary data

Table 8: Benefit of 1 ha lacquer applying intensive farming practice

<table>
<thead>
<tr>
<th>No</th>
<th>Items</th>
<th>Unit</th>
<th>Price</th>
<th>Quantity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total gain in 6 years</td>
<td>kg</td>
<td>110,000</td>
<td>2,868</td>
<td>315,480,000</td>
</tr>
<tr>
<td>2</td>
<td>Total cost in 6 years</td>
<td>kg</td>
<td></td>
<td></td>
<td>82,670,000</td>
</tr>
<tr>
<td>3</td>
<td>Lacquer grower’s earnings per year</td>
<td></td>
<td></td>
<td></td>
<td>33,258,571</td>
</tr>
</tbody>
</table>

Source: Calculation based on primary data

By applying intensive farming practices and using better seedlings, lacquer tree growers can increase their productivity, which then creates a higher income. Intensive farming will also increase the income of farmers by incremental income from higher quality of lacquer liquid. However, no information about prices to be obtained for higher quality lacquer sap could be collected, so the above two tables are made on the basis of a rough estimate using current prices as reference.

It is expected that farmers of Tam Nong, by applying new seedlings and intensive farming practices to 100 ha of new plantation, will be able to increase the total lacquer liquid production by 70 tons/year after 5-6 years, which will create an additional revenue of VND 6-7 billion for growers in the district. Further, Phu Tho’s agriculture leaders can replicate the model of Tam Nong to other districts, which could help increase the productivity from 0.39 tons/ha currently to 0.5-0.6 tons/ha and increase the total harvestable area of lacquer trees from 320 ha in 2009 to 500 ha in 2020. As a result, total production of lacquer in Tam Nong may reach 250-300 tons/year, which will create a total value of VND 25-30 billion for lacquer growers.

Higher productivity and larger scale of production will help lacquer growers to produce more efficiently. As a result, the price for raw material lacquer to be paid by domestic lacquer ware producers can be reduced. If so, lacquer liquid is more competitive with cashew nut oil as key material for lacquer ware production in the domestic market.

If the lacquer liquid can only be traded as raw material and if prices are subject to unpredictable price fluctuations, growers face severe constraints for future production of lacquer liquid. However, if some processors can apply advanced processing technologies, new markets can be developed and costs for
lacquer ware producers can be reduced further. The development of a lacquer processing industry can create farm jobs by encouraging farmers to extend lacquer tree cultivation areas and non-farm jobs as wage workers in processing industry. Moreover, intensive farming practices and better seedlings can help to exploit unused and bare upland areas, which also has positive side effect on reducing soil erosion in the long-term. This will surely be a new source of incomes for the poor, who used to own bare land in the area.

IV.4  Suggested Facilitation Activities

Upgrading possibilities and suggested agencies in charge are presented in the following table:

Table 9: Upgrading Solutions

<table>
<thead>
<tr>
<th>Upgrading solution 1:</th>
<th>Related facilitation activities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create systemic benefits to the lacquer sector by improving quality of seedlings of lacquer trees</td>
<td>• Build up a tissue culture nursery in Tam Nong district, perhaps in collaboration with the University of Agriculture No. 1; &lt;br&gt;• Support (techniques) to seedling suppliers in Tam Nong to increase the availability of good seedlings (red variety); &lt;br&gt;• Train trainers in varieties selection, nursery management, harvesting, marketing; &lt;br&gt;• Document good practice for seedlings so that the practice can be replicated for sustainable impact.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Upgrading solution 2:</th>
<th>Related facilitation activities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase productivity of lacquer trees</td>
<td>• Pilot growing of 3 ha of red lacquer trees from the tissue culture seedlings; &lt;br&gt;• Pilot growing of 25 ha of red lacquer trees from the selected seeds provided by Division of Agriculture of Tam Nong district. (This means support to about 50 farm households with 0.5 ha each. The estimated costs for this is 25ha*18ml/ha= 450 mln. VND); &lt;br&gt;• Provide extension services to 150 growers. (The estimated costs for this is 150 households *3ml/household= 450 mln. VND); &lt;br&gt;• Intercrop lacquer with “mach mon” crop to increase income of growers. This intercropping has three benefits: (1) keep high humidity for the soil, reduce watering cost, (2) incomes from the sale of “mach mon” trees, (3) if successful, residual CO2 emission permits can be sold for more income; &lt;br&gt;• Document good practice for lacquer so that the practice can be replicated for sustainable impact.</td>
</tr>
</tbody>
</table>
### Upgrading solution 3: Research & Development

- Analyze impact of applying Kitafon to lacquer liquid quality and longevity of lacquer trees;
- Put the result of this in the documentation of cultivation techniques for replication (if successful);
- Analyze the composition of natural lacquer and investigate options to reduce the drying time and removal - or neutralization - of the enzyme that causes allergic reaction to the skin.

### Upgrading solution 4: Introduce advanced lacquer processing technologies

- Do benchmarking of the quality of lacquer made in Tam Nong against other countries’ product;
- Investigate the know-how in lacquer processing to meet the best quality by inviting foreign experts to give the training/ or send experts to China or Japan to learn the techniques;
- Explore feasibility of domestic processing of lacquer, including the support for the setting up of a lacquer processing workshop with equipment;
- Assist newly established lacquer processing companies in marketing their product.

### Upgrading solution 5: Make quality testing service available in the region

- Establish a lacquer quality testing machine in the Division of Agriculture of Tam Nong;
- Train the staff at the Division in using the machine and offering quality testing services;
- Build up a quality control system to ensure the consistence of lacquer liquid quality.

### Upgrading solution 6: Create more non-farm activities to increase income

- Train people so that they can be capable of making lacquer ware (as wage workers in local companies) and have new job opportunities. Priority is given to those who have already some basic knowledge or who are unemployed;
- Offer more training on marketing and business management.

### Upgrading solution 7: Develop domestic market for lacquer liquid by substituting cashew nut oil

- Build up a proper supply chain for lacquer liquid to supply key lacquer ware producers in Viet Nam;
- Build up a marketing program to introduce Tam Nong lacquer.

### Upgrading solution 8: Create income sources from sub-products of lacquer liquid

- Investigate the opportunities to turn lacquer seeds into oil and candles to secure more income sources for farmers and other stakeholders;
- Support handicraft producers to participate in SYB (Start Your Business) and IYB (Improve Your Business) courses;
- Trade promotion for side products.
| Upgrading solution 9: Develop value-added lacquer ware products | • Train local people on lacquer ware production using natural lacquer. The lacquer ware production techniques from Japan and/or France are recommended; • Setting up a lacquer ware production group that can be independent or supply to lacquer ware companies. |
| Upgrading solution 10: Develop farmer groups to get better access to micro-finance | • Support the formation of lacquer grower groups to spread technical knowledge and share financial difficulties; • Form interest groups to disburse micro credit to help them have another source of capital. |
| Upgrading solution 11: Improve market knowledge and market links of lacquer ware producers | • Train handicraft and trading enterprise owners on business skills such as business management, negotiation techniques, market research; • Provide information about the preferences and requirements of the potential markets for handicraft making companies. Train technical staff of the handicraft enterprises so they can perform more sophisticated tasks such as designing so that the range of products become more diversified and highly commercialized in the markets identified above; • Invite foreign designers to develop new product ranges for lacquer ware companies; • Facilitate business linkages with foreign importers; • Conduct trade promotion activities such as trade fair visits, market prospecting visits etc. |
| Upgrading element 12: Improve working conditions of women | • Investigate and build capacity to improve Occupational Safety and Health and Labour conditions among lacquer and lacquer ware workers, taking international buyer requirements fully into account e.g. the introduction of gloves to protect women from lacquer allergen. |
| Upgrading element 13: Enhancing linkages/relationships between actors in the chain | • Supported by provincial authorities, foster increased dialogue and cooperation among farmers, handicraft producers and companies to build a strong network with commitment and ownership from each actor in demand-supply relationship. |
V. RECOMMENDATIONS

Market demand for lacquer is increasing again and both private sector actors and the local authorities are highly committed to support the development of the lacquer value chain in Phu Tho. It would be useful to have a regular discussion forum, where all representatives of the lacquer value chain meet from time to time. Such value chain stakeholder forum could come together, for instance, twice a year and discuss constraints, opportunities and development possibilities of the lacquer value chain. The present value chain study can serve as a basis for further discussion and orientation.

In addition, it would be useful to assess in more detail the different markets for lacquer ware products. In the framework of preparing this value chain study, it was not possible to find reliable data on lacquer sap, lacquer ware paintings or other final lacquer ware products. As for export, the export volume is hidden in general TARIC codes (such as for bamboo articles, furniture or household articles) and there are hardly any other studies on the Vietnamese lacquer and lacquer ware industry. For further market-based development it would be particularly useful to assess domestic demand for refined lacquer, lacquer liquid and substitution products. As there is a large domestic lacquer ware production, this is the main market for refined lacquer, which can potentially be produced in Phu Tho instead of being imported from China.

Increasing scale of production can help growers to work more efficiently and have better bargaining power. An increase in lacquer supply can be achieved also by improving the productivity of the existing lacquer area. Techniques of intensive farming can be introduced to lacquer tree growers by training in the field.

Lacquer growers and processors are keen to improve value addition by refining lacquer liquid according to international standard, instead of exporting low value lacquer liquid to China and re-importing refined lacquer for a 300% higher price. Knowledge about appropriate techniques and facilities to process lacquer liquid will provide a chance to change/upgrade the lacquer value chain in Viet Nam completely. The JP project can solve a major development bottleneck, if such technologies can be identified and the economic feasibility of refining lacquer in Viet Nam can be demonstrated. This will require some major effort, but is the key issue to be addressed in order to develop a more stable and reliable market for the lacquer tree growers in Phu Tho.
VI. APPENDICES

Appendix 1: Details of the two companies visited

- Tam Son lacquer painting company

The owner and director, Mr. Xuan is experienced in lacquer painting making as he has been making the product since 1989 when he started working for a company in Song Be province. He established his company in 2006 after a number of years working as a lacquer sap collector and sold to buyers in Song Be province. He used to sell to them lacquer sap as input for their production of lacquer paintings. However, at times the products were not selling well, the buyers of lacquer sap paid him with pain- 
tings. He, then, had to sell the paintings and got used to selling the product. He, then, had an idea of having a painting making company as he got the market to some extent.

His main product now is lacquer pictures of Ho Chi Minh and King Hung’s Temple. According to his judgment his products are better than those made in Ha Tay. The average annual revenue is about VND 700 to 800 millions. He usually sells to final users. He used to rent a shop in Viet Tri city but because of seasonality of sale, which is usually at peak in the final 4 months of the year, he found it difficult to cover the rental for the whole year, then he stopped renting the shop.

Every year he uses about 1200 – 1300 kilos of lacquer sap of different types. One important input for the outer layer which makes paintings shiny must be imported from Japan or Hong Kong. The distinctive feature of the imported lacquer sap is not only that it helps bring the shine to the paintings but also it can become dry very quickly.

He feels confident about the technology of lacquer painting making as he has been in the business for many years. He is also optimistic about the market in the future as the pictures (for longevity celebration) are selling very well in the end of every year.

However, as he is short of capital he cannot afford to make a lot of paintings and keeps high invento- ries for selling at peak times. Also, due to capital shortage he had to owe his employees salaries till the end of the year and every month he pays only the subsistence amount to the employees. Another difficulty in renting an area of about 1000 square meters for treatment of liquid waste before emit them to the environment, so he sees a danger of pollution made to the surrounding land.

His needs support with regard to financing, expansion of the production and marketing.

- Lacquer painting cooperative

The owner, Mr. Minh, has a long time experience of making lacquer paintings as he used to be a tech- nical employee of Phu Tho lacquer painting company, a state-owned enterprise. When the company was dismantled he established his own production unit. He is the only one from the former company who still keeps the job, all his fellow workers quitte- 
d and they now buy pictures from him for resale.
His production relies almost on the lacquer sap locally made and he buys the inputs mainly from Tam Nong or Cam Khe districts. He confirms that if pictures are made properly according to the technical procedures the high quality can be ensured although only domestically made lacquer is used. He masters the required know-how of processing/mixing inputs made locally to make good products. He is one of very few persons who can do this.

His output is mainly lacquer vases or a few other handicraft for sale in the home market. The buyers are traders in the province or from Hanoi and other provinces. Recently he makes products according to the orders placed by a company in Hanoi. The order is usually accompanied by samples or pictures showing samples and he made on the requested specifications. The owner of this buying company, Mr. Ma, is very good at lacquer painting production both as a person and a director. Mr. Minh has also learnt the expertise from him. Mr. Minh knows that the ordering firm, then, export products to Japan, a market of very strict consumers.

He now has an idea of setting up a business in Hung Temple offering tours to visitors: tourists can see the making process and buying lacquer painting. For this he need more well trained technical workers. He also wants to strengthen partnership with Mr Ma’s companies and increase sale to the company.

He needs support with regard to technical trainings for his workers, designing, coloring and product development and business skills.
**Appendix 2: List of interviewees in Tam Nong district**

<table>
<thead>
<tr>
<th>No</th>
<th>Name</th>
<th>Function</th>
<th>Commune</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. Nguyen Hai Minh</td>
<td>Head of Cooperative and Rural Development Dept., DARD of Phu Tho</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mr. Ngo Quang Truong</td>
<td>Staff, Cooperative and Rural Development Dept. DARD Phu Tho</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Mr. Trieu Quang Ket</td>
<td>Chairman of Tam Nong district PC</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mr. Nguyen Chi Thang</td>
<td>Tam Nong District People Committee, former head of Agriculture division</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Mr. Nguyen Duc Trong</td>
<td>DARD Tam Nong</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Mr. Thái</td>
<td>Di Nau commune chairman</td>
<td>Di Nau</td>
</tr>
<tr>
<td>7</td>
<td>Mr. Nguyen Duc Xuan</td>
<td>Lacquer grower</td>
<td>Di Nau</td>
</tr>
<tr>
<td>8</td>
<td>Mr. Han Trong Lam</td>
<td>Seedlings provider</td>
<td>Di Nau</td>
</tr>
<tr>
<td>9</td>
<td>Mr. Ta Han Hung</td>
<td>Lacquer liquid trader</td>
<td>Di Nau</td>
</tr>
<tr>
<td>10</td>
<td>Ta Doan Khanh</td>
<td>Lacquer grower</td>
<td>Di Nau</td>
</tr>
<tr>
<td>11</td>
<td>Mr. Quy</td>
<td>Tho Van commune chairman</td>
<td>Tho Van</td>
</tr>
<tr>
<td>12</td>
<td>Nguyen Quang Thuan</td>
<td>Lacquer grower</td>
<td>Tho Van</td>
</tr>
<tr>
<td>13</td>
<td>Nguyen Van Tuat</td>
<td>Lacquer liquid collector</td>
<td>Tho Van</td>
</tr>
<tr>
<td>14</td>
<td>Nguyen Ngoc Xuan</td>
<td>Lacquer ware maker</td>
<td>Tho Van</td>
</tr>
<tr>
<td>15</td>
<td>Mr. Ha Van Tan</td>
<td>Lacquer grower</td>
<td>Tho Van</td>
</tr>
<tr>
<td>16</td>
<td>Mr. Minh</td>
<td>Lacquer ware maker</td>
<td>Viet Tri city</td>
</tr>
</tbody>
</table>
Appendix 3: *Project Area Profile (2009)*

### The socioeconomic situation of Phu Tho province in 2006

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area (ha)</td>
<td>352,841</td>
</tr>
<tr>
<td>Agriculture</td>
<td>98,585</td>
</tr>
<tr>
<td>- Forestry</td>
<td>165,490</td>
</tr>
<tr>
<td>- Aquaculture</td>
<td>3,940</td>
</tr>
<tr>
<td>Population</td>
<td>1,337,737</td>
</tr>
<tr>
<td>Total GDP (million dong)</td>
<td>8,119,527</td>
</tr>
<tr>
<td>Agriculture – Forestry – Aquaculture (million dong)</td>
<td>2,271,924</td>
</tr>
<tr>
<td>Industry (million dong)</td>
<td>3,053,327</td>
</tr>
<tr>
<td>Services (million dong)</td>
<td>2,794,276</td>
</tr>
<tr>
<td>GDP per capital (million dong)</td>
<td>6.07</td>
</tr>
<tr>
<td>Poverty rate (%)</td>
<td>31.08</td>
</tr>
</tbody>
</table>

**Source:** Agriculture Division, Tam Nong district

### The socioeconomic situation of Tam Nong district of Phu Tho province in 2006

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area (ha)</td>
<td>15,578</td>
</tr>
<tr>
<td>Agriculture</td>
<td>7,227</td>
</tr>
<tr>
<td>Forestry</td>
<td>3,617</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>573</td>
</tr>
<tr>
<td>Population</td>
<td>81,888</td>
</tr>
<tr>
<td>Total GDP (million dong)</td>
<td>319,363</td>
</tr>
<tr>
<td>GDP per capital (million dong)</td>
<td>3.9</td>
</tr>
</tbody>
</table>

**Source:** Agriculture Division, Tam Nong district
Appendix 4: Program Coverage Area