

# Rubber in the GMS: An Integrated Research Exercise on Rubber Development in Lao PDR

Dr. Linkham Douangsavanh

Mr. Souklaty Sysaneth

Dr. Monthatip Chanphengxay

Mr. Phouvieng Ladavong

Dr. Bounthong Bouahom

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## ACRONYMS and ABBREVIATIONS

ACIAR	Australian Centre for International Agricultural Research
APB	Agriculture Promotion Bank
ASEAN	The Association of Southeast Asian Nations
Baan	Village
CIAT	International Centre for Tropical Agriculture
CPI	Consumer Price Index
CPS	Champasack
DAFO	District Agriculture and Forestry Office
EU	European Union
GDP	Gross Domestic Product
GIS	Geographic Information System
GOL	Government of Lao PDR
HHs	Households
HRD	human resources development
INRA	International Natural Rubber Agreement
IRSG	International Rubber Study Group
LA	Land Allocation
Lao PDR	Lao People's Democratic Republic
LNT	Luang Namtha
LUP	Land Use Planning
MAF	Ministry of Agriculture and Forestry
MOU	Memorandum of Understanding
MRC	Mekong River Commission
NAFES	National Agriculture and Forestry Extension Service
NAFRI	National Agriculture and Forestry Research Institute
NGO	Non-Governmental Organization
PAFO	Province Agriculture and Forestry Office
PLUP	Participatory land Use Planning
PPCO	Provincial Planning and Cooperation Office
RDP	Rural Development Project
SADU	Small-Scale Agro-Enterprise Development in the Uplands
SALT	Sloping Agricultural Land Technology
SDC	Swiss Agency for Development and Cooperation
Sida	Swedish International Development Cooperation Agency
SPSS	Statistical Package for Social Science
Sumernet	Sustainable Mekong Research Network
SVK	Savannakhet
UNDP	United Nations Development Programmed
VDC	Village Development Committee
VDP	Village Development Project
VES	Village Extension System
WFP	World Food Programme
WTO	World Trade Organization
WWF	World Wildlife Fund

## **SUMMARY**

Rubber is one of the hottest commodities in world markets. Many Asian countries are the major rubber producers. Lao PDR is also influenced by surrounding important rubber producers and markets such as Thailand, China, and Vietnam. While rubber cultivation is expanding rapidly in Lao PDR, the Government and different international organisations, including institutional arrangements, planning, policy, regulation and the information that supports, are paying great attention and express their concerns on the industry. Many issues related to rubber were raised and discussed within related agencies. The Vientiane Smallholder Rubber Workshop in June 2006 and the NAFRI Rubber Stakeholders Meeting in December 2006 also had highlighted many concerns about the economic, social and environmental impacts of the rapidly expanding sector including the rapid, unplanned and uncontrolled landscape change and lack of information, transparency, and accountability in the rubber plantation.

The objectives of this research were to 1) explore the existing policy support for farmers planting rubber, contract system between investor and producer, credit support for farmers, facilitation in terms of permission for rubber plantation and trade, different regulations including taxes and make a market analysis, 2) make an analysis of the market options for farmers planting rubber and examine factors having an impact on market efficiency and analyze the market chain, 3) make a livelihood analysis, change of standard of living, agricultural practices and relationship between farmers since the inception of rubber planting, and 4) determine the regional aspects of rubber plantation and option and finally come up with the policy briefs for suitable land use, technical aspects, socio-economic and livelihood improvement.

The research methodology used was intergraded with different techniques such as reviewing secondary information, conducting in-depth face-to-face interviews by using both interview guidelines and structural interview question with rubber farmers and other government stakeholders. After that the data was analysed by using SPSS for Microsoft Windows to find out the statistics such as frequencies, percentage, mean, maximum, and minimum.

The results were found that there are some existing supports to the farmers planting rubber such as financial support from the Agricultural Promotion. The government initiated some policies to eliminate slash and burn agriculture and establish a permanent crop. The government also initiated the policy for poverty eradication by the year 2020, which farmers have to increase their income. Planting rubber trees is one of the promoted agricultural activities.

The price and marketing for rubber product is different according to product quality and form. In the northern provinces, the rubber is marketed to China



through the middleman. On the other hand, the rubber product marketing in the central part is quite a high price and sold to Thailand.

The rubber farmers in the northern part had low education, which are only up to primary school levels. In addition they have a very limited land area holding. However, they have higher household labour than other parts, while the rubber farmers in the central and southern parts have limited household labour comparing to the rubber production areas. The rubber farmers in the northern part had very limited off-farm income. The farmers in all parts raised animals such as poultry, cattle, goats, and pigs for their home consumption mainly. It has been found that rubber plantation had some impacts on small holder farmers in terms of agricultural land and productions. However, it provides some positive support to the government strategy in stop shifting cultivation.

In order to improve the existing rubber production and reducing the impacts of both individual farmer and farmer organisation, it is recommended as follow:

### **Northern Province**

- Provide technical support on rubber production techniques, pest and disease control, post harvest to improve the quality, and other agricultural production techniques which can integrate with rubber plantation to generate more income or secure the food during the start of planting;
- Strengthen the rubber production group by providing capacity building skills for the group member in planning and management, accounting, and marketing and increase the role of the production group in marketing process to reduce the middleman and increase the profit;
- Prepare the crop calendar and planning for harvesting and marketing among the group members to reduce the over supply;
- Set up post-harvest facilities such as a dry and storage facility for value added to the rubber product and grade the product and apply a primary processing to increase the value of the product before export;
- Review the contract between farmers and the farmer organisation and the farmer organisation and the private trade company;
- Consider to provide more rubber production areas for the farmers if it is possible; If it is not possible provide support on off-farm income generation for the rubber farmers, because they still have sufficient labour;

## **Central and Southern Provinces**

- Establish rubber organisation or production group with providing capacity building skills for the group member in planning and management, accounting, and marketing;
- Provide technical support on rubber production techniques and other agricultural production techniques which can integrate with rubber plantation to generate more income or secure the food during the start of planting;
- Set up post-harvest facilities such as a dry and storage facility for value added to the rubber product and grade the product and apply a primary processing to increase the value of the product before export;
- Review the contract between farmers and the farmer and the private investment company; and
- Consider the process to hire labour for harvesting the rubber, because the rubber farmers in the central and southern parts have limited household labour.

## **Policy Recommendation for the Government of Lao PDR**

Based on the result of the study, small holders still need a lot of supports in terms of to enhance production capacity, quantity and quality, and marketing. Therefore, the government should consider some policies to support them as follows:

- Setting up an organisation or centre to be responsible for rubber research and development. This centre can be all rubber information centre;
- Increase capacity for technical staff in rubber production, marketing, research and development;
- Ministry of Agriculture and Forestry should provide technical experts to support small holder rubber farmers;
- Identifying suitable land areas for increasing the production with minimizing environmental impact;
- Increasing value added to rubber products by processing in the country before export;

- Revising existing policies such as 2+3 policy, 1+4 policy, and land concession policy, because it may be adapted in one area, but not in others ;
- Allocating sufficient land to individual farmers;
- Land use planning for different economical agricultural production;
- Integrated farming in rubber plantation area;
- Developing models for rubber groups and expanding into different part of the country; and
- Increase the rubber processing facilities in different part to increase value added for the product.

# **1. INTRODUCTION**

## **1.1 Background**

Rubber is one of the hottest commodities in world markets. World rubber consumption has increased at an average rate of 5.9 percent per year. During 2007, the world rubber consumption was almost 6.4 million tonnes. The top rubber producers are Thailand, Indonesia, Malaysia, China, Vietnam, and India respectively which produce proximately 9.9 million tonnes. The major rubber importers are China, USA, Japan, Republic of Korea, and Germany respectively (The Thai Rubber Association).

With increased disposable income, more purchases of motorized vehicles and improvements in the transportation system, tyre consumption will increase dramatically. As world economic growth, the requirement for natural rubber is still increasing, as well as the trading price, which increases the incentive to farmers in many countries to move on rubber production.

Many Asian countries are the major rubber producers. Lao PDR is also influenced by surrounding and important rubber producers and markets such as Thailand, China, and Vietnam. Lao PDR is currently experiencing a sudden, rapid and largely uncontrolled expansion of rubber cultivation. It is clear that growth in China's demand for rubber is influencing the Chinese investment in rubber planting in northern of the Lao PDR and is very likely influencing the Vietnamese proposals for rubber plantation expansion in southern of the Lao PDR. Many experienced rubber investment companies from the surrounding countries have been applying different strategies to promote the rubber production in the Lao PDR. Some industry experts predict that the estimated 20,000 hectares of rubber plantations in the country at present will grow up to 220,000 hectares by 2010.

While rubber cultivation is expanding rapidly in Lao PDR, the Government and different international organisations, including institutional arrangements, planning, policy, regulation and the information, are paying great attention and concern. Many issues related to rubber were raised and discussed within related agencies. The Vientiane Smallholder Rubber Workshop in June 2006 and the NAFRI Rubber Stakeholders Meeting in December 2006 also had highlighted many concerns about the economic, social and environmental impacts of the rapidly expanding sector including the rapid, unplanned and uncontrolled landscape change and lack of information, transparency, and accountability in the rubber plantation

Therefore, this study is conducted to address the important missing information such as some socio-economic backgrounds of small holder farmers planting rubber and the impacts of the rubber production on their

livelihoods. Finally this study also proposes some policy recommendation to the government to minimise the impacts.

## **1.2 Objectives**

The overall goal of the research was to enhance the governance of natural resources and to catalyze the transition to sustainability in the Mekong region.

Specific objectives of the complimentary group 'Meeting regional and global demands for rubber: A viable option for poverty alleviation in the Mekong Basin?' include:

- Enhanced understanding of socio-economic and livelihood issues of current rubber development through collaborative studies:
- To explore the existing policy support for farmers planting rubber, contract system between investor and producer, credit support for farmers, facilitation in terms of permission for rubber plantation and trade, different regulations including taxes and make a market analysis
- To make an analysis of the market options for farmers planting rubber and examine factors having an impact on market efficiency and analyze the market chain
- To make a livelihood analysis, change of standard of living (material assets, food, health care, education, and infrastructure), agricultural practices and relationship between farmers since the inception of rubber planting.
- To determine the regional aspects of rubber plantation and option and finally come up with the policy briefs for suitable land use, technical aspects, socio-economic and livelihood improvement.

## **1.3 Research Questions**

In order to reach the above objectives, the research questions are as follows:

- What are the existing policies, regulations, and supports for rubber farmers and traders?
- How is the rubber planted and marketed?
- What are the important social economic backgrounds of the rubber farmers influencing rubber plantation?
- What are the impacts of the rubber plantation on the farmers' livelihood that they have aware of?

- How can the impacts be addressed and what are recommendations to key policy makers in related organizations in different levels for improving and developing appropriate policies?

To answer these questions, this study utilized a combination of desk-based and field research approach. The research had been carried out during September and December 2008, in Lao PDR and China. Desk studies investigated the key issues such as rubber production and marketing situation in Lao PDR. Field research, through semi-structured in-depth interviews, was carried with rubber farmers and responsible staff in related agencies in Luang Namtha Provinces in northern, Vientiane Capital, Bolikhamxay, and Khammuan in the Center, and Champasack Province in the South of Lao PDR.

#### **1.4 Structure of the Report**

This scientific report is divided into different sections. It starts with the introduction. After this introduction section, the second section is summarised the literature reviews which includes background of rubber plantation in Lao PDR, Current rubber production, Land concession policy, the existing policy supports for rubber farmers, the technical support for them, the contract systems, and benefits of small holder rubber.

The third section is described about research methodology used to obtain the information. This section includes the research locations and methodology.

The fourth section is discussed on the research findings on 1) Current rubber production in Lao PDR, 2) Existing policies related to rubber production, 3) Rubber trading, 4) Some certain basic socio-economic backgrounds of the rubber farmers, 5) Rubber production systems, 6) Production investment costs and return, and 7) Problems and impacts of rubber plantation on farmers' livelihoods.

The final section is conclusion and recommendation. This final part provides some policy recommendation to improve the rubber production and support to rubber farmers in order to ensure a more sustainable trajectory for the 'rubber boom' in Lao PDR.

## **2. LITERATURE REVIEW**

### **2.1 Background of rubber planting in Lao PDR**

Rubber had been planted in surrounding countries for many decades. The first rubber plantation in Laos was known during 1996 in different places along the border areas with Thailand and China. The rubber farmers had experiences by working in rubber farmers in neighbouring countries. However, the rubber was not a famous crop during that time.

Until the price of rubber had increased during 2003, the rubber plantations had been spreading through the whole country. Many foreign companies also flooded into Lao PDR to invest in rubber plantation. (Duangsavanh, 2008)

### **2.2 Current rubber production in Lao PDR**

Rural farmers across Lao PDR have become increasingly interested in rubber during the last decade. Strong market demand for natural rubber in China, improved road networks in rural areas of Laos and an abundance of land has encouraged foreign investors from China, Thailand and Vietnam to promote rubber planting in almost all part of the Lao PDR.

Unlike other cash crops, rubber offers long-term benefit streams to farmers for a period of 30 to 40 years. Farmers can not only benefit from tapping latex but also from intercropping other crops in first few years after planting and selling rubber timber after tapping cessation. The steady increase in rubber prices and benefits of a long term perennial cash crop suggest that rubber may be an appropriate crop for Lao upland farmers who are rapidly becoming integrated in the market economy.

On the other hand, the rapid rush to plant rubber raises many environmental, economic, and social concerns. Rapid expansion of rubber causes large scale loss of forest resources and watershed destruction, particularly important in Laos where rural food security is directly related to forest health. Large scale rubber concessions disregard local resource tenure. Thus, the rapid expansion of rubber planting has social implications such as communal rights to exploit natural resources are made moot. (*Keptanh. at el, 2006*)

The GoL had promoted the rubber production because of many reasons. The first reason is that the government sees the rubber production at a household level as a means of addressing endemic poverty amongst communities. This production is able to use the available household labour. The rubber product is also significant demand. The next reason is that the rubber production can replace two major prohibited agricultural practices such as opium cultivation and slash and burn agricultural systems. In addition, the production had a reliable price and the plant can produce the rubber for a long period, which

can secure farmers' income. Finally, during the first few years of the rubber establishment, it can be integrated with some important stable food crops or cash crops. This can bring income to the farmers before the rubber is ready to harvest. (Duangsavanh, 2008)

According to Forestry Research Center (2007) Luang Namtha had the largest rubber production area which was 8,770 ha. The second and third largest rubber production areas were Champasak and Oudomxay province respectively. Phongsaly province has the smallest rubber production area. (see the table 1)

**Table 1: The of current and future predicted total rubber production areas**

No	Province	Current Planted Area (ha)	Predicted planted area by 2010 (ha)
1	Luang Namtha	8,770.00	20,000.00
2	Champasak	6,719.00	13,000.00
3	Oudomxay	4,530.00	20,000.00
4	Luang Prabang	2,467.00	2,000.00
5	Khammuane	1,447.00	
6	Salavan	1,418.00	19,840.00
7	Bolikhambay	1,026.00	
8	Bokeo	701.00	15,000.00
9	Attapeu	500.00	10,000.00
10	Vientiane Capital	474.00	
11	Savannakhet	243.00	
12	Vientiane Province	100.00	10,000.00
13	Sekong	100.00	10,000.00
14	Xayaboury	66.00	50,000.00
15	Phongsaly	13.00	14,000.00
<b>Total</b>		<b>28,574.00</b>	<b>183,840.00</b>

Source: Forestry Research Center, 2007

### 2.3 Land Concession Policy

The GoL had applied land concession policies based on the three hierarchies of decision making as followed.

- For the areas of 3-100 ha, the provincial authority is the approval body.



- For the areas of 100-10,000 ha, the Ministry of Agriculture and Forestry is responsible for granting concessions, after permission is granted from the government.
- For the areas of over 10,000 ha, the government is the approval authority for the concessions, after approval by the parliament.

The land concession can be granted to an individual farmer or private company which to invest in an agricultural activity. The land concession costs between US\$ 4 to 7 depending on type and location of the land. (Duangsavanh, 2008)

#### **2.4 The existing policy support for farmers planting rubber**

The rubber tree is a potential of industrial tree for export, and provides a high income. There are many experts who have expressed the idea that this can be a poverty reduction strategy for Lao people that provides a sustainable income, and reducing the shifting cultivation in the rural area, in the case of shifting cultivation is far from the market. According to a report from Non-Government Organization, many Rural Development Projects had focused on smallholder rubber productions in the North and South of Lao PDR. (*Keptanh. at el, 2006*)

More recently, there seems to be the beginning of the 'rubber boom' for the Lao PDR. Both central and provincial governments considered that the rubber plantation can play an important role in stop shifting cultivation, poverty elimination and eradication. Thus the commodity is envisioned as the key of economic growth, which led to increasing of rubber farmers.

However, the GoL had very little influence rubber cultivation, except signing of MOUs with foreign investors, companies and agencies from China, Vietnam, and Thailand.

The main effort of the GoL so far is to establish a rubber research program at the NAFRI with the first experimental station in Luang Namtha Province. This station will be used for all research and study related to rubber production and marketing. Rubber should be considered as a strategic commodity and a package of policies through various dimensions should also be developed. Since rubber is being considered to play an important role in eliminating shifting cultivation and poverty eradication, surely some measures will be taken towards to make it as a strategic commodity. The policy should include all process involve with rubber production, processing and marketing. This will involve a number of ministries, beginning with the Ministry of Agriculture and Forestry, the Ministry of Industry and Commerce, Ministry of Investment and Planning, Land Management Authority, Water Resources and Environmental

Agency. A number of programmes will also have to be developed among various agencies at all levels. (*Alton et al, 2005*)

## **2.5 The Technical Support for the Farmers**

Villagers in Northern Laos tend to draw lessons and knowledge about rubber production from relatives across the border in Sipsongpanna, China. Thus, some basic skills on establishment of rubber plant can be done by farmers in the north of Laos. However, seeds, buds, grafting materials, tapping equipments, and technical support still come exclusively from China. Most villagers have little or no experience with commercial crop production in the northern provinces. In essence there is a huge gap between the high demand for massive rubber production in the country and the current level of knowledge/technology available locally. Variety selection for specific areas, improved germplasm, latex tapping, processing and storing techniques and skills are the most essential needs to support the rubber growing industry in the country. While the Ministry of Agriculture and Forestry is highly interested to mainstream rubber production as means to improve the income level of poor, it still faces constraints in lacking of technical staff specialized in rubber production. Beside the limited number of local experts there is little information exchange with other developed industries in other countries along this issue. Thus, what appropriate level of investment the country should take according to the current level of technology and expertise, it is still questionable. Low investment most likely results to low yield of rubber production. (*PATHETLAO DALY Newspaper, 2 May 2006*)

## **2.6 The contract systems**

The overwhelming majority of farmers in Laos lack the capital to invest in rubber plantation. Financial institutions, the state-owned or private banks, lack the capacity to financially support farmers with an interest in rubber production. Therefore, the predominant models for the expansion of rubber involve a package of financial and technical support from foreign investors.

In the south of Laos, investors have been provided large-scale concessions (in some provinces more than 25,000 ha) with long-term leases. In these instances, there are few opportunities for smallholders to participate and there are many concerns regarding the social and environmental impacts of such concessions.

In the North, it was recently decided by the three major rubber producing provinces (Bokeo, Luang Namtha and Oudomxay) that investors will not be offered large-scale concessions. Rather, investors will have to work with district and local authorities to establish arrangements with potential rubber farmers. It was also decided last year that areas 5km along the national

border are also off-limits for rubber planting. While Luang Namtha has taken a cautious approach, Oudomxay decided to give some concessions despite the aforementioned agreement.

In the North, investors (the majority are Chinese though a few wealthy Lao also make local investments) signed contracts with individual farmers or village groups wherein all or most capital expenditures for rubber are covered by the investor. In addition, the investor provides technical advice on planting and sometimes even the labour to establish the rubber. Thereafter, villagers provide maintenance of the rubber in whole or in part. In the eighth year when tapping begins, the production is shared between farmers and the investment company in the ratio of 50% each. In some case it was shared by investor 60%, while the farmers could get only 40%. All latex is purchased by the investor, though floor and ceiling prices are never stipulated in the contracts. The contracts usually stipulate that upon cessation of tapping the rubber.

Another issue concerns the approval process for rubber investments. Because it has not been clarified whether rubber is an agriculture commodity or forest plantation species, different policies and institutions have been used to reach agreement with investors. In the North, the authority to approve investments is based on the size of the investment (monetary size of investment). In the south, the authority to approve is based on the area of concession (number of hectares). (*Keptanh. at el, 2006*)

The contracts of rubber plantation between investors and producers in Khammuam and Champasak provinces had two types of the contracts such as: The first contract type called extension contracts. In this contracts, the company or investor provide rubber seedlings, fertilizers, some money and technology to farmer. This contract had 6 years duration. After 6 years the farmer has to return the investment costs to the company or investor by deducting 10% from the total production sale each time. The second type is "2+3 Policy", which the farmer had owned the land and contribute their family labours, while the company contribute the seedlings, provide technical support, and market the products. (RRC, 2008)

In some cases plantations are established by Lao smallholders with the financial support of relatives from across the border, lowland wealthy Lao investors or small Chinese investors. This form is relatively widespread. The area varies from 3 ha up to 50 ha. Usually the Lao farmers provide land, while the investor supplies capital covering all the set-up expenses for the plantation. The agreement between the contracting parties is usually marked by 3 types of contract:

- Verbal agreements between the two parties (mainly between cross-border relatives)

- Informally written contracts between the two parties not ratified by local authorities
- Legally signed contracts ratified by local authorities

The second form of investment is based on larger land concession schemes. Plantations are established through massive investments by Chinese companies. Plantations extend over very large areas, up to hundreds of ha. Chinese companies sign the contracts directly with the Lao central government, arranging the rubber set up with the villagers later on. The terms of the contracts are similar to the ones arranged in case of small-scale investments above, with the risky difference that Chinese investors have a much larger share of plantation area that they plan to manage by employing local labour. So far, wage rates proposed by the companies prefigure dangerous labour exploitation. Yet, this type of plantation is becoming a more widespread model despite its ambiguities in relation to labour and land use rights.

Small-scale investments by Chinese relatives seem to be sounder than big concession-type investments by Large Chinese investors. The former despite often being based on unofficial contracts, guarantee more security to the farmers in terms of capital and land use rights, as they rely on family or friendship trust; concession type contracts are more ambiguous in terms of labour input and remuneration, marketing of latex, and duration of land lease. Moreover, by virtue of the fact that they involve larger areas of land, the latter model is more risky, for it reduces land availability to the farmers for the whole duration of the contract (30-40 years).

Finally, none of the contracts in Muang Sing area had the price set from the Chinese investors. They usually say that the investor will buy the latex from the farmers at the current price on the market, which means that it won't guarantee much security for the farmers, if the latex price drops.

## **2.7 Benefit of small-holder rubber**

Smallholders are characterized by their small size (many of them had about less than 3 hectares) and their relatively low incomes. Some people are dependent on rubber as their primary source of income. Subsistence agriculture (vegetables and domestic animals, especially poultry and pig) ensures that most rubber small holders do not starve, although they may be short of funds for medicine, education.

Nevertheless, most smallholders are unable to earn sufficient income to invest in high-yielding planting materials, or to adopt less labour intensive harvesting methods.

- Many unused land areas in the past, at present that land are being used effectively to plant rubber trees by small-holders rubber.
- Reduce shifting cultivation area due to farmers have new job to do such as plant rubber trees.
- Rubber farmers gain knowledge on rubber from each other as well as from Chinese specialist.
- Generate income from selling rubber and improve their livelihood.

*(PATHETLAO DALY Newspaper, 2 May, year not known.)*

### **3. RESEARCH METHODOLOGY**

#### **3.1 Research Locations**

Lao PDR is divided into 3 different geographical parts such as Northern, Central, and Southern. The northern part consists of mostly high and hilly mountainous areas, while the central and southern parts are relatively flat areas. The central part is mostly lowland, whereas the southern part consists of a higher fertile plateau.

The three parts have different rubber production practices and market which are influenced by the neighboring countries. The northern provinces such as Luang Namtha, Oudomxay, and Phonglary are mostly influenced by China, while the central provinces such as Vientiane Capital, Vientiane, Bolikhamxai, and Khammuan Province are reliable on Thailand. The southern provinces for example Savannakhet and Champasack have depended on both Thailand and Vietnam.

According to the limitation of the available rubber farmers in each province, one to three provinces were selected in each part for in-depth study. The total selected five provinces represented the three geographical parts of Lao PDR are Luang Namtha in the North, Vientiane Capital, Bolikhamxay, and Khammuan in the centre, and Champasack in the South.

In each province, the field survey had undertaken from one to three villages in one to two districts. The in-depth interviews were conducted with all level such as PAFO staff, Provincial Planning and Investment officers, DAFO staff, District Trade and Custom Officers, rubber traders, and rubber farmers.

In addition, the research team also had visited Yunnan Province, the southern part of China, to obtain more information on supply and demand for rubber and trading in the border area.

The total number of interviewees was 180 people in both Lao PDR and China. The interviewee in Lao PDR included 120 rubber farmers, 31 government staff in each level, and 8 rubber traders and private sectors dealing with rubber investment. In china the team had interview 8 rubber farmers, 8 related government staff, and 7 traders and private sectors. The details are in the table 2 below.

**Table 2: The target province and number of interviewees**

<b>Geographical Location</b>	<b>Name of Target Province</b>	<b>No. of In-depth Interviewees</b>
<b>Northern Part</b>	Luang Namtha	56 Rubber farmers 3 Government staff 3 Private sectors and traders
<b>Central Part</b>	Vientiane Capital Bolikhamsay Khammuan	40 Rubber farmers 21 Government staff 3 Private sectors and traders
<b>Southern Part</b>	Champasack	24 Rubber farmers 5 Government staff 2 Private sectors and traders
<b>China</b>	Yunan	8 Government staff 7 Private sectors and traders 8 Rubber farmers
<b>Total</b>		<b>180 people</b>

### **3.2 Research Methodology**

The research methodology used was intergraded with different techniques such as reviewing secondary information, conducting in-depth face-to-face interviews with rubber farmers, conducting focus group interviews with key PAFO and DAFO staff in provincial and district levels, and traders in the related study location. Focus group interviews with Chinese local staff, rubber traders, and farmers were also applied during the study visit to Yunnan Province. The research had collected both qualitative and quantitative data through interviews with farmers, district and provincial officials, extension workers, traders/investors and factory owners in Lao and China side.

In order to obtain the required information to achieve the research objectives from different target groups, different tools were used. The interview guidelines were applied with group interviews with PAFO, DAFO, and other government staff related to rubber production and trading, and during the study tour to China. The detail of the interview guidelines are in the annex 1 and 2. The structure interview questionnaire was applied with rubber farmers (see annex 3).

The interview guideline to obtain information from related stakeholders such as government sectors, private sectors, and rubber farmers was aim to explore the existing policy support for farmers planting rubber, contract system between investor and producer, credit support for farmers, facilitation in terms of permission for rubber plantation and trade, different regulations including taxes, and factors having an impact on market efficiency and analyze the market chain. Therefore, the guideline is divided into different issues such as the existing policy support for farmers planting rubber, the contract systems between investor and producer, the credit support for farmers, the facilitation in terms of permission for rubber plantation and trade, the different regulations including taxes and make a market analysis, and the market issues for rubber production. Each issue also consists of a number of questions (see annex 1).

An interview guideline was also applied when conducting the study trip to China. The information to be obtained includes rubber production information in the border areas in China, rubber trading and marketing in the Lao-Chinese border, and current and future demand and supply for rubber in the border area. The detail of the support questions are in the annex 2.

Individual in-depth interview with rubber farmers was applied by using a structure interview questions. It was designed to obtain three major information issues such as social economic background of the rubber farmers, rubber production practices, and impacts of rubber production on their livelihood. Each part consist of a number of support questions, such can be seen in the annex 3.

The data collection period was during September to November 2008. After that the data was compiled and analyzed. The results were discussed and recommended to policy makers.

The steps that involve data analysis are as follows:

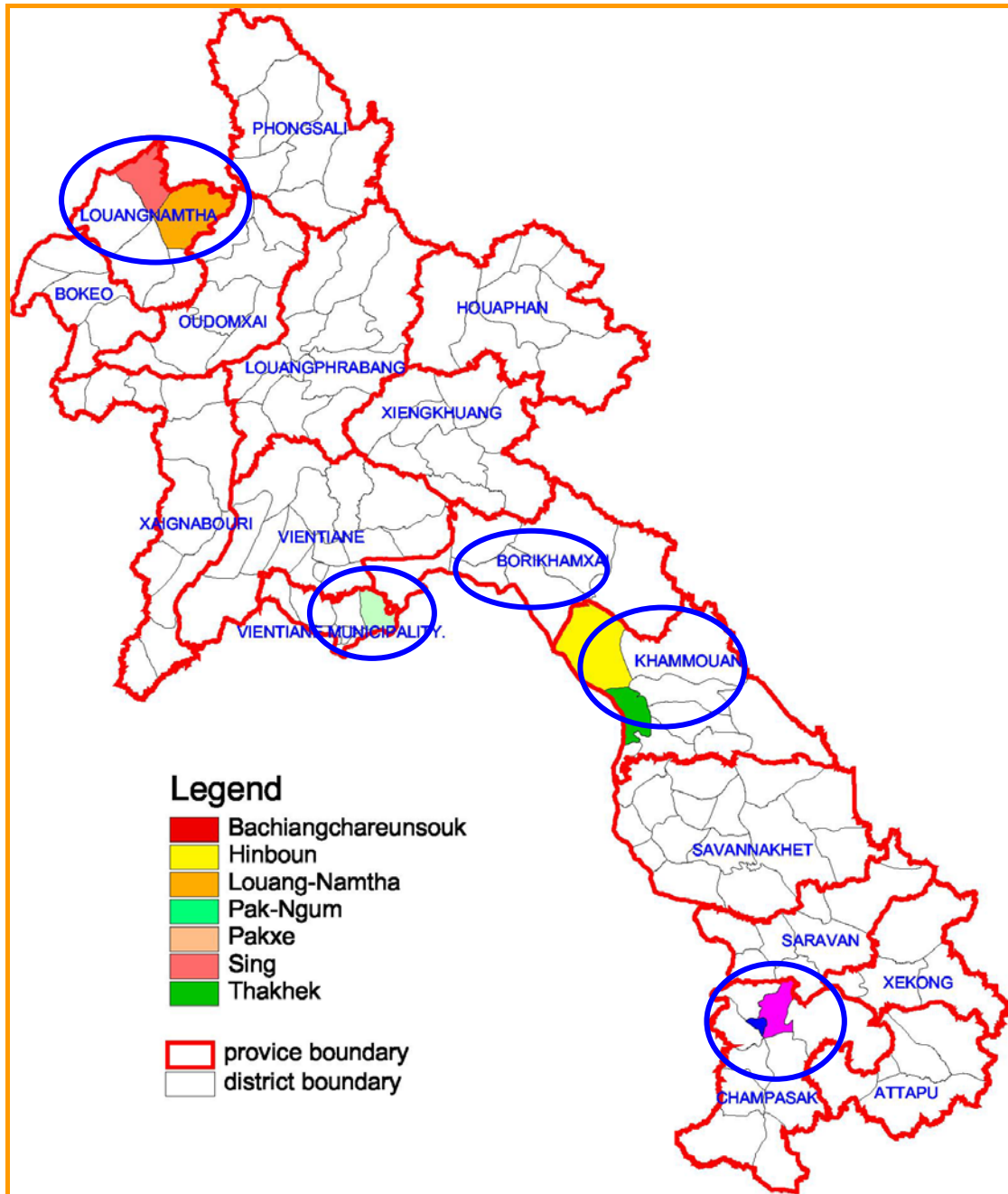
1. All interview questions were checked to make sure that there will not be any missing information.

2. The raw data was inputted in a computer and analyzed by using Statistical Package for Social Science program (SPSS) for Microsoft Windows.

3. The results were reviewed and discussed to make final conclusion and recommendation.

The statistics that were used to describe the information are Frequencies, Percentage, mean ( $\bar{X}$ ), Minimum, and Maximum.

Figure 1: Map of Lao PDR and study locations in five provinces





## **4. RESEARCH FINDINGS**

### **4.1 Current Rubber Production in Lao PDR**

#### *- Production History*

The rubber was introduced to Lao PDR many decades ago. It was first planted in Champasack Province. However, due to unattractive price of rubber during that time, the production was not increasing. Until 1990s rubber production was re-promoted in the Northern (Luang Namtha Province) and Central part (Khammuan Province) of Lao PDR. Now the rubber plantation is increasing dramatically over the country.

#### a) Northern Part

The first rubber plantation in northern Lao PDR was in 1994 at Luang Namtha province. The objectives of the rubber planting project in Luang Namtha to be a solution to the problems of the upland farmers, and thus it addresses the three goals of the Government of Lao (GOL) for upland farmers: elimination of shifting systems, opium cultivation, and reduction of poverty. The fifth provincial party conference had chosen rubber production as a priority to solve the poverty of people in upland and planned to plant rubber in the total of 20.000 ha by the year 2010.

#### b) Central Part

In the central part, initially the rubber plantation was introduced to Khammuan Province by Ketphoudoi Development Company and an individual casual farmer in 1990. The seedlings were imported from Thailand and Vietnam. The initial production areas were 80 ha. In 1996, rubber plantation was introduced to Xangthong District, Vientiane capital by a GTZ project with the production area of 114 ha. The seedlings used were import from Thailand.

#### c) Southern Part

Since 1930, rubber tree had been introduced to Lao PDR. Firstly, it was planted in Bachiang District, Champasack Province for 2 ha. Many rubber trees are still alive up to now with the age of 78 years old. The villagers around these plantations previously tapped the resin (latex) just for fun and used them to trap the small animals, insects and birds. So far, nobody pay attention to those trees and consider them as a less significant tree comparing to some local species.

In 1991 the Development of Agriculture Forestry Industry (DAFI) had planted about 1,800 rubber trees for resin production. In the same year State programme had planted rubber trees for 13 ha and today is conducting to

collect resin. In 2006 Cao Su Dak Lak Company from Vietnam had invested for rubber planting in the province, especially in the Bachiang District. Rubber plantations in southern parts are continuing to widespread to other surrounding provinces such as Saravan, Sekong and Attapeu. The rubber varieties used were RRIV-4 from Vietnam and RRIM 600 from Thailand. (Forestry Research Centre, 2006).

*- Rubber Production Area*

Since 2006, rubber plantation had been rapidly spread over the countries. During 2006 the production area was approximately 30,578 ha. By the year 2010 the total rubber production areas will expect to be 180,000 ha. The largest plantation area is in the southern part which was accounted for more than 60% of the total production areas. However, by the year 2010, the northern part will be the largest rubber production areas, which plans to increase up to 120,000 ha of rubber plantation area. (See table 3)

**Table 3: Rubber Plantation Area in Each Part of Lao PDR**

Region	Current Planting		Planned by 2010	
	Area (ha)	%	Area (ha)	%
Northern	10,064	32.91	120,000	66.67
Central	1,926	6.30	10,000	5.56
Southern	18,588	60.79	50,000	27.78
<b>Total:</b>	<b>30,578</b>	<b>100.00</b>	<b>180,000</b>	<b>100.00</b>

*Source: FRC Rubber Survey (2006)*

*- Investment Characteristic*

In some cases plantations are established by Lao smallholders with the financial support of relatives from across the border, lowland wealthy Lao investors or small Chinese investors. This form is relatively widespread. The area varies from 3-4 ha up to 20-50 ha. Usually the Lao farmers provide land, while the Chinese investor supplies capital covering all the set-up expenses for the plantation. The agreement between the contracting parties is usually marked by 3 types of contract:

- 1) verbal agreements between the two parties (mainly between cross-border relatives)
- 2) informally written contracts between the two parties not ratified by local authorities
- 3) legally signed contracts ratified by local authorities

The second form of investment is based on larger land concession schemes. Plantations are established through massive investments by Chinese companies. Plantations extend over very large areas, up to hundreds of ha. Chinese companies sign the contracts directly with the Lao central government, arranging the rubber set up with the villagers later on. The terms of the contracts are similar to the ones arranged in case of small-scale investments above, with the risky difference that Chinese investors have a much larger share of plantation area that they plan to manage by employing local labour. So far, wage rates proposed by the companies are bordering on dangerous labour exploitation. Yet, this type of plantation is becoming a more widespread model despite its ambiguities in relation to labour and land use rights.

*- Private Rubber Trading Companies*

Until recently, it has not been found that any local or national companies invest in rubber trading in Lao PDR. All of the private rubber trading companies are from China, Vietnam, and Thailand.

In 2000, 3 companies from China had been decided to investment in rubber production in Luang Namtha Province such as Yunnan Local Product Import-Export CO. LTD, Rubber Company Beijing Jinxianglian CO.LTD and Foreign Economic Commerce CO. LTD Sip Song Panna.

In 2001, The Foreign Economic Commerce Division, Yunnan had approved the project agreement No. 002. After that 3 companies had cooperated to establish a company called SINO-LAOS RUBBER CO. LTD and set up a rubber processing factory in Luang Namtha, which has the processing capacity of 6,000 tonnes/year. The company has established 3 rubber nurseries by using new clones from Yunnan such as Yuyan 77-2 and Yuyan 77-4 in Na Lae District (220,000 seedlings), Namtha District (1,500,000 seedlings) and Meuang Sing (300,000 seedlings) giving the grand total number of 2,020,000 seedlings.

The company had also expended investment in Oudomxay rovince in 2003 by planting more than 159 ha of rubber these in 2004 and setting 2 rubber nurseries in Houn District (with 50,000 seedlings) and in Beang District (with 1,000,000 seedlings). All rubber seedlings were imported from Yunnan, China by using clones Yuyan 77-2, Yuyan 77-4 and RRIM 600 (SINO-LAOS RUBBER CO. LTD et al., 2004).

In 2004 SINO-LAOS RUBBER CO. LTD had established a rubber nursery in Bokeo Province and supported 3,000 rubber seedlings. Now the total rubber plantation area of the company is 701 ha.

In 2004 SINO-LAOS RUBBER CO. LTD brought rubber clones Yuyan 77-2 and Yuyan 77-4 to nursery in Vientiane province with amount 200,000 seedlings. In 2006 the province has an agreement to approve for land concession on rubber planting 100 ha for LAO-THAI HUA RUBBER CO. LTD (SINO-LAOS RUBBER CO. LTD, 2004).

Now, more investors are flooding into rubber production industry in Lao PDR. The detail is in the table 4 below.

**Table 4: External Rubber Investors in Lao PDR**

Location	Area (ha)	Investment Amount	Investor	Remark
LNT	NA	NA	Sino-Lao Co	
LNT	NA	NA	Chinese & others	Planting of seedling nurseries in both Nam Tha & Sing districts
LPG	NA	NA	Chinese	Signed with LPG province
CSK,SKG, SVN	10,000	\$22 million	Viet Nam General Rubber Corporation	Rubber factory 18,000 tonnes/yr Viet Nam General Rubber Corporation from Ho Chi Minh Chi Minh. For 50 yrs
LNT, OXY, BKO	1,000	¥30m	Chinese government & private sector	Not yet signed also research station & seed production facilities
CSK	10,000	\$ 30m	Quang Tri Rubber Co subsidiary of (VRC)	2,000 trees in 2005
CSK	10,000	NA	VN-Laos Rubber Joint-Stock Company; 6 subsidiaries of VN Rubber Corp	2,000 ha this yr; 400 local laborers & 100 Vietnamese workers
Bachiang & Xaysombo un	10,000	NA		Rubber company from Ho Chi Minh Chi Minh
PSY, Boun Neua Dist.	1,000	\$ 900,000	Agr Dev Co	PPCO signed agreement w/ Tai Fong Agr Dev Co to plant 1,000 ha for 400 HHS in M Boun Neua (B Yo) \$900,00
CSK, Bachiang Dist.	3,000	NA	Agr Co of Dak LAK	Also produce organic fertilizer in plant at km 46 in Pathoumphone; produce fertilizer for rubber
VTE P & BKY	16,000	Bath 20 m (\$ 500,000)	Thai Rubber Latex Group	Survey in Vte P & BKY; 2,000 workers; also sent to factory in area (Beung Kan?)
OXY, M Nam	1,300	\$ 1m in 2004	China Chien Fong (Mengla)	Plans 6,300 ha 2004-8
SKT	11,000	NA	Thai Hua Rubber Company, Ltd	Discussions with Governor of SKT
SVN, SKG, APU	NA	NA	Vietnamese company	
SKT,SVN, SKG APU,CSK	NA		Vietnamese research institute in cooperation with NAFRI	Survey of southern provinces for potential for rubber & cashew nut cultivation

Source: Lao - German Program Rural Development in Mountainous Areas of Northern Lao PDR, Para Rubber Study *Hevea brasiliensis* Lao P.D.R.2005, pp 7

## 4.2 Existing Policies Related to Rubber Production

The Village Development Committee (VDC) prepared a plan for the province which included: potential designated rubber tree cultivation land to be divided amongst producing households according to their available labour. They then gave each of the four production units the responsibility for clearing land, planting seedlings, managing cultivation (including regular weeding of the intercrops in immature rubber trees) and then monitoring. They then created a fifth unit for the group of households who had land in other locations. These production units would also arrange for fencing around the perimeter of the large rubber tree field.

### *- Financial Support*

The province first had arranged for low interest loans through the Lao National Bank (LNB) and received about 12 million Kip in 1994. The individual household loans ranged from 1-3 million Kip with an interest rate of 2% per annum for fifteen years pay back period. 60 households had borrowed the investment fund for clearing land, seedlings, fencing and planting. Then, in the second year (1995) another loan was negotiated in the amount of 10 million Kip with the same interest rate. At the same time the Agricultural Promotion Bank (APB), the major financial provider for agricultural production in Lao PDR, had provided individual loan for rubber farmers. However, the interest rate was 7% with 15 years payback period.

All producing households in 1994-1996 received subsidized loans from the province for the cost of seedlings and some fencing. Each producing household received between 1-3 million Kip in credit to plant rubber trees.

**Table 5: Loans for Rubber Production in Hat Nhao Village, Luang Namtha Province during 1994-95**

Year	No. of Households	Production Area (ha)	Loan Amount (Kip)
1994	60	94.30	12,873,340
1995	93	249.70	10,000,000

In the southern province link Chmampasack most small holders use their old budget for investing the rubber plantation. However, they had started with small investment fund as it available step by step.

*- Government Strategies on Rubber Planting in Lao PDR*

The Lao People's Democratic Republic is one of the poorest and least developed countries in South East Asia; it has among the worst social indicators in the region. GDP per capita income is low (around US\$436 in 2007, NSC 2008). Poverty incidence is very high in a predominantly agricultural, rural economy. Poverty incidence in the rural areas is much higher (the rural poor account for more than 90 percent of all poor); and overall, the central parts of the country are generally better off in comparison with the south and north.

By this current situation, the Government of Lao has drawn out a policy and strategy to fight with this poverty. The National Growth and Poverty Eradication Strategy have been emphasized to be completed in year 2020. By the same time, policy objective of increasing forest cover to 60 percent has been set.

To realize these policies and strategies, rubber tree cultivation was one alternative to support them. To make it relevant, from the central level, actually the Ministry of Agriculture and Forestry is under drafting the strategy of research and implementation of trees and NTFPs varieties/seeding sources in which it includes varieties of rubber trees. The GoL gives opportunity to foreign and local investors to invest in rubber trees cultivations as mentioned in the policy.

**Table 6: Planting Arrangements**

<b>Arrangements</b>	<b>Farmers' input</b>	<b>Benefits for farmers</b>	<b>Problems and concerns</b>
Smallholder (self-financed, sometime credit from government)	- Land - Labour - Capital	All profit from latex and timber goes to farmer (farmer seeks market on their own)	- Checking quality of inputs (i.e. varieties) - Management of plantation (i.e. pest, frost) - Processing of latex - Marketing
Contract farming (promoted in the north)	- Land - Labour	Farmers are provided with initial investment inputs, technical assistant, and market for the product.  Profits from latex and timber sales are shared among farmers and investors (investors purchase products)	- Uncertainty of household labour supply - Uncertain profit share and contract arrangements - Lack of confidence/commitment of local farmers to contract farming
Concession (Mainly in the south)	- Labour Worker	Farmer could plant rice inter cropping with rubber during the first two years  Monthly and daily payment for labour	- Job is not guarantee - The workers are taken advantages and unfair payment - Unclear social welfare provided by the concessioners - Some concession areas were taken from local people

*- Policy Implication*

Primary findings from this research could provide relevant information to concerned authorities at the central and provincial levels on:

- Villagers are directly exposed to economics abuse from foreign and local rubber investors or traders due to their non experience in bargaining, in conducting any contract and poor knowledge in rubber know-how. It might be a source of financial leakages occurring from rubber tree development in the country if this issue is not taken into consideration by the Government since the onset;



- The role of concerned local Banks, such as the Agriculture Promotion Band in appropriately assisting Lao rubber small holders to be able to get access to a fairer loan and not being too abused by foreign companies. If not, Lao small holders would be poorer than before, which would be in contradiction to the Government Policy on Poverty Eradication;
- The risks of rubber mono culture, specifically its cumulative impacts to the daily life of Lao small holders living in the remote areas, as well as on the environment resources sustainability and the National Eco Tourism Pilot Projects Areas. As the northern part of the country is mostly mountainous with quite high slopes, rubber plantation areas would be highly exposed to mud sliding during the heavy rain period, as it has occurred in neighbouring countries. Moreover, rapid expansion of rubber at a large scale could affect the forested areas and their biodiversity resources;
- What would be exactly the costs and benefits from rubber tree plantation in the short and long term to Lao villagers and Lao Government as well? These costs and benefits have not been analyzed into more details yet;
- Non-readiness of the whole sectors and society levels (local community, public and private sectors) of the country in promoting rubber development in the country in a sustainable way, and how could it be able to steadily contribute to poverty alleviation and environment resources sustainability of the country. Research on the appropriate rubber technology transfer is still at the infancy stage. The public trade sector has not been able to provide relevant information to local small holders on the right foreign rubber markets and traders and train them on the market negotiation. Relevant pieces of legislation have not been promulgated in order to ensure protection of Lao smallholders rights and benefits; and
- The important role of Lao women in the rubber process. They have been playing remarkable involvement in generating their family income from their process in addition to ensuring their families food security and happiness, such as taking care of their children and house hold duties, as well as NTFPs harvesting in a sustainable way.

*- Strategic Options*

In order to steadily develop rubber tree plantations in a sustainable manner, making it surely contributing to poverty alleviation, halting opium poppy plantation, stabilizing slash and burn shifting cultivation and ensuring

environment resources sustainability, there are the following main strategic options:

- a) Farmers, both male and female, need to be trained in all aspects of Para rubber tree cultivation practices, including: establishment, maintenance, tapping, processing, marketing, and timber sales and negotiation. In processing they should be made aware of the opportunities, costs, and returns of selling other forms of rubber with more value added, such as clean cup lumps, raw rubber sheets, raw liquid latex, and smoked rubber sheets. There also needs to be training on rubber grower association formation, which could potentially lead into a rubber cooperative or appropriate agro community to learn or practice to bargain and negotiate;
- b) Clear policies and appropriate measures from the Agricultural Promotion Bank to enable Lao farmers, such as rubber small holders getting loan with low interest and realistic period of grace;
- c) Local Community-Extension-technology transfer research interaction is vital. There is a feed forward of field level realities related to cultivation, harvest and sales-t he opportunities, problems, and constraints-from the local community issues and needs, extension system to the technology transfer researchers and local small holders, such as be at the proposed Luang Namtha Experiment station representing the Northern Part, or in any NAFRI networks representing the central and southern Part of the country. They should be constantly feeding relevant field information concerning opportunities, problems and constraints forward into the technology transfer research program. Technology transfer could rely on China, Thailand, Vietnam or Indonesia, such as on inter cropping, high yield, and prevention of environment impacts, i.e. mud sliding and soil quality should be urgently undertaken;
- d) Land concession to foreign and local investors in rubber tree plantation at a large scale should highly consider the benefits and the costs from rubber tree plantation in particular and the need to do socio and environment impact assessment before the concession given;
- e) Set up network mechanism providing information and advices on time related to world rubber markets, their tendencies, etc... . in order to minimize the gap of financial leakages and abuse in the rubber sector;
- f) Promulgation of relevant pieces of legislation ensuring the rights and profits of Lao rubber small holders, including land tenure;

- g) Promotion and development involvement of Lao women in the rubber process as appropriate, such as strengthening their capacity as mentioned in; and
- h) Undertake further research on the costs and benefits as well as the costs effectiveness analysis from rubber tree development in the country.

### **4.3 Rubber Trading**

As mentioned above, the rubber production is influenced by the neighbouring countries. They are also the main markets for rubber product. The rubber exported from Lao PDR is mainly in the form of raw materials, which is rubber dried in the sun. Only some farmers apply basic processing for rubber to make dried sheets before export.

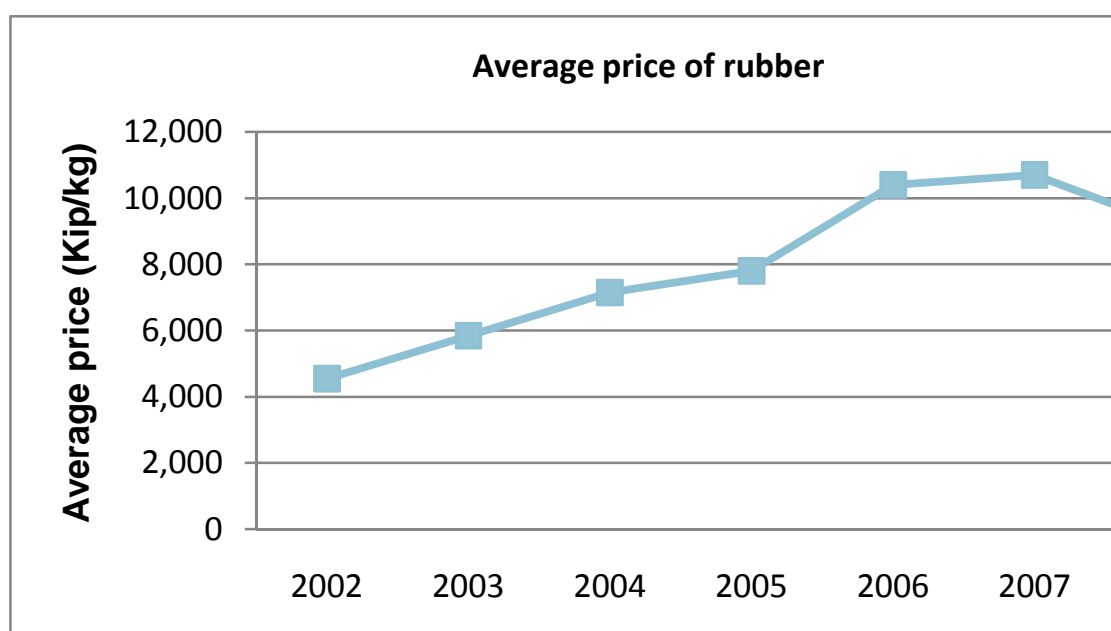
#### *Price of Rubber*

The price of rubber had been gradually increasing over the past 5 years. The rubber products traded in the three parts are also different as well as the price.

Most rubber farmers did not grade their rubber product. They sell as general grade. In the centre of Laos the farmers sell rubber after processing in dried sheets with the price of between 20,000 to 23,750 Kip/kg. However, the farmers in the northern of Laos usually sell their products in dried blocks with the price of between 5,200 to 9,100 Kip/kg.

In Luang Namtha Province, especially in Had Nhao village, all rubber products must be sold to the rubber group organisation in the village. However in the central and southern parts of Lao PDR, the farmers sell their rubber production to private businessmen.

Figure 2: The Average Annual Rubber Price in the Luang Namtha Province



#### *Farm Gate Prices and Middlemen*

For all transportation expenditure of rubber from a farm in Hat Nhao to border gate are calculated as following:

- Labour spent for transferring rubber from farm gate to a truck is around 20,000 Kip per tonne.
- The cost of transportation from farm gate to the border gate is around 150,000 Kip per tonne
- The rubber price in Hat Nhao (farm gate price) is around 6,250 Kip/kg and the border gate price around 17,500 Kip/kg. Therefore, expenditure cost that need for transportation in 1 tonne (tub lumps) from farm gate to border is around 4,120,000 Kip, but 1 tonne of rubber selling in border gate could earn the profit around 11,250,000 Kip.
- The exporter or middleman has to pay 35% of income tax which equivalent to around 3,950,000 Kip per tonne.

Therefore, in the present situation many middlemen (both Lao and China) come to buy rubber products in the farms and then sell in the border to a Chinese merchant.

#### *Marketing Chains*

Each part has its own marketing channel. The rubber market in the Northern provinces is mainly China, while in the central part is mostly Thailand. The rubber markets in the southern provinces are both Thailand and Vietnam.

In the northern part, especially in Luang Namtha Province, the rubber products are sold to a Chinese merchant by farmers themselves (in Sing District) and by a local rubber group organisation (in Luang Namtha District). After that it is exported to a Chinese merchant or a rubber processing factory in China. (See figure 3).

In the central part, especially in Khammuan Province, the rubber products are sold to a Thai broker directly by the farmers or through a local broker. Then, it is exported to a Thai merchant or a rubber processing factory in Thailand. (See figure 4).

In the southern part, in case of Champasack Province, two major rubber producers, individual rubber farmers and DAFI Company are selling rubber to two different markets such as Vietnam and Thailand. DAFI Company is selling its rubber product mostly to Thai market, while individual farmers are selling it to a broker. After that it is exported to a Vietnam and Thailand. It was also reported that the rubber product passed though Vietnam and exported to a rubber processing factory in China. (See figure 5).

**Figure 3: Marketing channel of rubber in the Luang Namtha district and Sing district, Luang Namtha province**

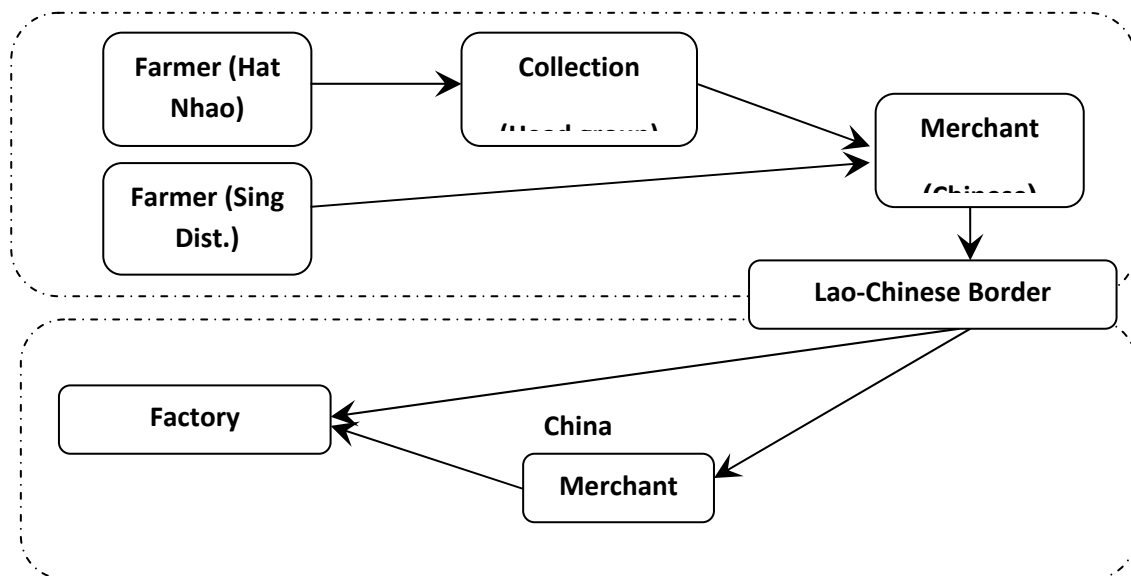


Figure 4: Marketing Channel of Rubber in Thakek, Khammuan Province

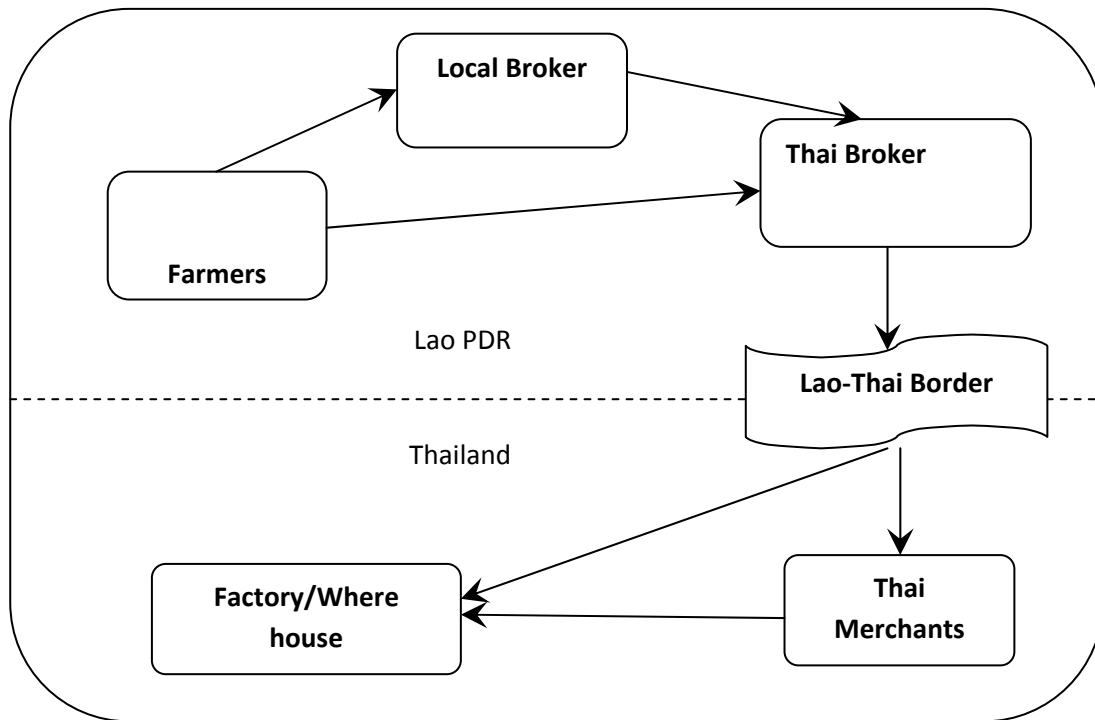
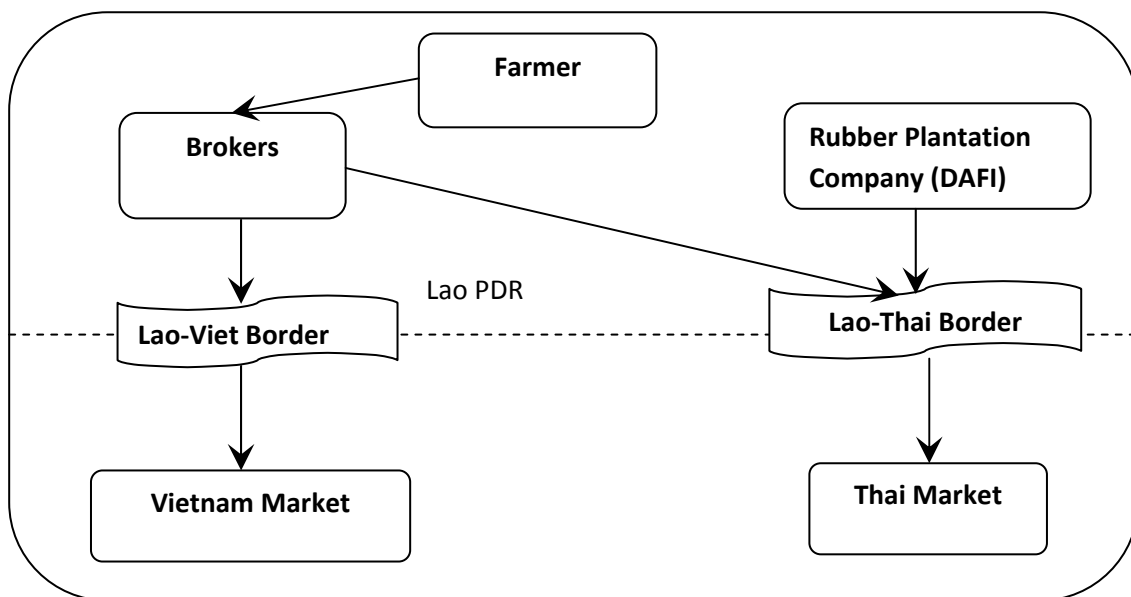


Figure 5: Marketing Channel of Rubber in the Champasack Province

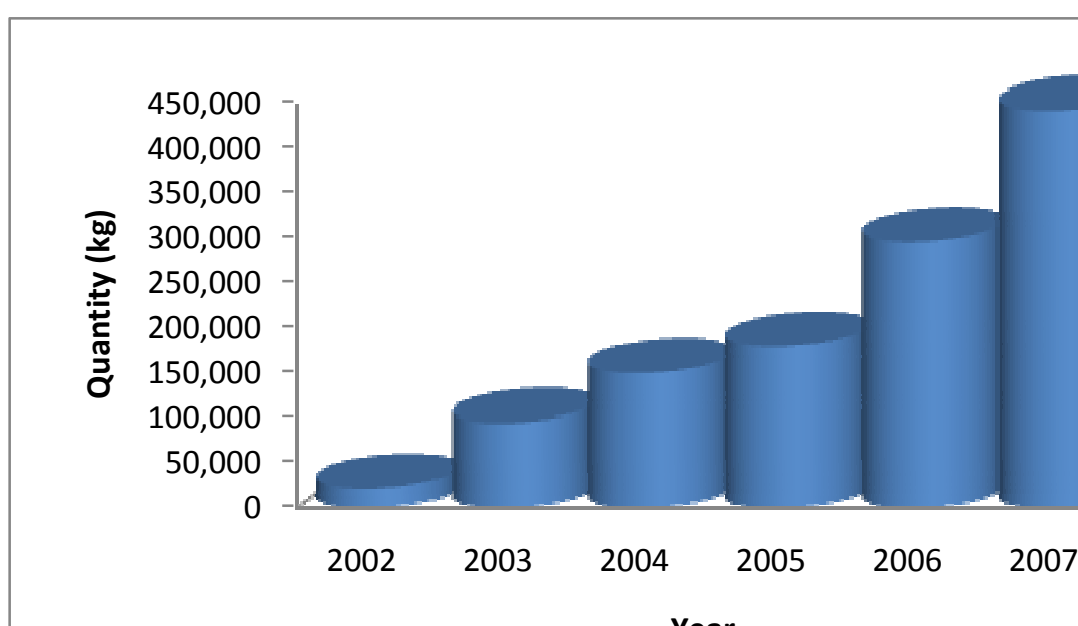


### *The Potential Markets and Market demand*

As the market of rubber is dramatically expanding, especially in the neighbouring countries such as China, Vietnam, and Thailand, the supply for the Lao PDR is still far behind the demand. The world rubber consumption in 2007 was 6,394,000 tones. China is the largest rubber consumption which was 1,654,000 tones (The Thai Rubber Association).

Since 2002, Lao PDR had been gradually exported the rubber to china. It exported only 22,000 kg in 2002, whereas in 2007 it increased to 443,620,000 kg.

**Figure 6: Export Rubber Quantity from Lao PDR to China**



#### **4.4 Some Certain Basic Socio-Economic Backgrounds of the Rubber Farmers**

120 rubber farmers in 3 geographical locations were selected for in-depth interviews. Some certain basic socio-economic backgrounds of the rubber farmers have been divided into two parts such as social and economy.

**Table 7: The Frequency of Interview Rubber Farmers Classified by Location**

Research Location	Frequency (Households)	Percent (%)
Northern Province (Luang Namtha)	56	46.67
Central Provinces (Vientiane Capital,	40	33.33
Southern Province (Champasack)	24	20.00
<b>Total</b>	<b>120</b>	<b>100.00</b>

### *Social Backgrounds of the Rubber Farmers*

Some certain basic social backgrounds of the farmers are illustrated by the frequencies, average, maximum, and minimum of gender, age, main occupation, education level, number of household member, number of household fulltime labour, and key decision maker in the household.

**Gender:** The majorities of the respondent rubber farmers were male accounted for 100 people (83.30 percent), while the rest just 20 people were females.

**Age:** The minimum age was 26 years old, while the maximum age was 68. The average age of the respondent farmers was 48.2 years old. The rubber farmers in the northern part had the lowest average age (42.5 years old), while the farmers in the central part had the highest average age (52.7 years old). The rubber farmer in the southern province had the average age of 47.5 years old.

**Main Occupation:** More than two third of the farmers (70 percent) had the main occupation of being farmers, whereas the rest of them were also government employees, businessmen, and retirees, which were accounted for 20 percent, 6.70 percent, and 3.30 percent respectively. All of the respondents from the northern province had the main occupation of fulltime farmers (56 people), while most of the respondent from southern province had the main occupation of Government employees (20 people). They just planted rubber for additional income or main income source when they are retired. In the central provinces there were mixed between fulltime farmers (24 people), businessman (12 people), and pensioners (4 people). The businessmen expanded their income sources by planting rubber trees.

**Education Level:** The largest group of the respondent farmers (80 people or 66.60 percent) had the education level between primary school to secondary school. 28 of them (23.40 percent) had the education level of vocational and higher level, while the rest 12 people (10 percent) had never gone to school. The rubber farmers in the southern part had the highest education level comparing to those in the northern and central part. The majority of them (16 from 24 people) had hold graduate diplomas and higher, while the largest number of the rubber farmers in the northern province had the education level of primary school and lower.

**Numbers of Household Members and Labour:** The minimum household member number was 4 people, whilst the maximum number was 15 people. The average number of household members was 6.67 people. The minimum household labour over 15 years old number was 1 people, whilst the maximum number was 5 people. The average number of household labour



over 15 years old was 2.57 people. The rubber farmers in the northern province had the highest average household labour (almost 3 people/household), while those in the central provinces had the lowest (2 people/household). The average household labour in the southern province was 2.67 people.

Key decision maker in the household: 60 percent of the farmers said that the husband is the key decision maker in the household, while only 13.30 percent responded that housewife is the key decision maker. Some respondents also said that both husband and wife have to agree before making the decision in the household which is account for 23.30 percent.

**Table 8: The Social Backgrounds of the Interviewed Rubber Farmers**

Some Social Backgrounds	Frequency	Percentage
	(n=120)	(%)
1. Gender		
Male	100	83.30
Female	20	16.70
2. Age		
Maximum	68	Years old
Minimum	26	Years old
Mean	48.2	Years old
3. Main Occupation		
Farmer	84	70.00
Government employee	24	20.00
Businessman	8	6.70
Others	4	3.30
4. Education Level		
Never go to school	12	10.00
Primary School and lower	40	33.30
Secondary School	40	33.30
Vocational and higher	28	23.40
5. Numbers of Household Members		
Maximum	15	people
Minimum	4	people
Mean	6.67	people
6. Numbers of Household Fulltime Labour over 15 years old		
Maximum	5	people
Minimum	1	people
Mean	2.57	people
7. Key decision maker in the household		
Both husband and wife	28	23.30
Husband	72	60.00
Wife	16	13.30
Others (single family)	4	3.30

### *Some Certain Basic Economic Backgrounds of the Rubber Farmers*

Some certain basic economic backgrounds of the rubber farmers are shown by the total land holding, rubber plantation area, rubber land ownership, current land use, total annual household income, total annual farm income, total annual non-farm income, total annual household expenses, total annual agricultural expenses, and total annual off-farm expenses from the 1<sup>st</sup> of April 2007 to 31<sup>st</sup> March 2008.

**Total Land Holding:** The minimum total land holding was only 0.64 ha, while the maximum was 100 ha. The average total land holding was 13.55 ha. The rubber farmers in the southern province had the largest average total land holding (23.21 ha) and followed by the farmers in the central (17.99 ha) and northern part (6.25 ha) respectively.

**The rubber plantation area:** The average rubber plantation land holding of the samples was 18.51 ha, while the minimum and maximum areas were only 0.64 had and up to 100 ha respectively. The rubber farmers in the southern province also had the largest average rubber plantation area (20.00 ha) and followed by the farmers in the central (11.85 ha) and northern part (4.60 ha) respectively.

**Land Ownership of rubber plantation area:** 66.70 percent of the respondents had land use permission which is certified by tax invoice. 26.7 percent of the farmers have land title, while few of them have access the production land by renting or obtaining concession and using the land of their relative.

**Current Land Use:** The majority of the farmers (66.70 percent of the total) used their land for crop productions, while the rests used for integrated agricultural production which included both crops and animal production. All of the rubber farmers in southern province used their land for only production, while those in the northern and central provinces implemented integrated agricultural production.

**Total Annual Household Income (from 1<sup>st</sup> of April 2007 to 31<sup>st</sup> March 2008):** The minimum of the total annual household income was 1,470,000 Kip, whereas the maximum was 234,460,000 Kip. The average of the total annual household income was 44,901,000 Kip. The rubber farmers in the central province had the highest average total annual household income (66,114,000 Kip), while those in the northern province had the lowest (30,498,000 Kip). The rubber farmers in the southern province had the average total annual household income of 42,801,000 Kip.

**Total Annual Farm Income (from 1<sup>st</sup> of April 2007 to 31<sup>st</sup> March 2008):** The minimum of the total annual agricultural income was 0 kip, whereas the

maximum was 207,060,000 Kip. The average of the total annual farm income was 24,120,000 Kip. The rubber farmers in the central province also had the highest average total annual farm income (30,643,000 Kip), while those in the southern province had the lowest (6,830,000 Kip). The rubber farmers in the northern province had the average total annual farm income of 26,870,000 Kip.

Total Annual Non-Farm Income (from 1<sup>st</sup> of April 2007 to 31<sup>st</sup> March 2008): The minimum non-farm income was 0 Kip, whereas the maximum was 88,344,000 Kip. The average of the total annual non-farm income of the samples was 18,605,000 Kip. The rubber farmers in the central province still had the highest average total annual non-farm income (35,471,000 Kip), while those in the northern province had the lowest (1,813,000 Kip). The rubber farmers in the southern province had the average total annual non-farm income of 29,676,000 Kip.

Total Annual Household Expenses (from 1<sup>st</sup> of April 2007 to 31<sup>st</sup> March 2008): The minimum of the total annual household expenses was 2,457,000 Kip, whereas the maximum was 227,905,000 Kip. The average of the total annual household expenses was 53,676,976 Kip. The rubber farmers in the central province had the highest average total annual household expenses (101,263,000 Kip), while those in the northern province had the lowest (22,097,000 Kip). The rubber farmers in the southern province had the average total annual household expenses of 48,050,000 Kip.

Total Annual Agricultural Expenses (from 1<sup>st</sup> of April 2007 to 31<sup>st</sup> March 2008): The minimum of the total annual farm expenses was only 65,000 Kip, whereas the maximum was 184,792,000 Kip. The average of the total annual farm expenses was 23,665,540 Kip. The rubber farmers in the central province also had the highest average total annual agricultural expenses (55,160,000 Kip), while those in the northern province had the lowest (3,142,000 Kip). The rubber farmers in the southern province had the average total annual agricultural expenses of 19,059,000 Kip.

Total Annual Off-Farm Expenses (from 1<sup>st</sup> of April 2007 to 31<sup>st</sup> March 2008): The minimum of the samples having off-farm expenses was 720,000 Kip, while the maximum of household off-farm expenses was 148,835,000 Kip. The average of the total annual off-farm expenses was 30,011,437 Kip. The rubber farmers in the central province still had the highest average total annual off-farm expenses (46,102,000 Kip), while those in the northern province had the lowest (18,955,000 Kip). The rubber farmers in the southern province had the average total annual off-farm expenses of 28,990,000 Kip.

Livestock: Most of rubber farmers raised animals for home consumption and for cash when they need such as livestock, goat, pig, and poultry in the average of 6.54, 2.20, 1.47, and 20.97 heads respectively.

More than half of them had a farm equipment. 18 out of the total respondents (30 people) have a hand tractor, while only few of them have a rice mill and stressor (4 and 3 farmer respectively).

**Table 9: The Frequencies and Percentages of the Interviewed Rubber Farmers Classified by Some Economic Backgrounds**

Some Economic Backgrounds	Frequency (n=120)	Percentage (%)
<b>1. Total Land Holding</b>		
Maximum	100.0	ha
Minimum	0.64	ha
Mean	13.55	ha
<b>2. Rubber Plantation Area</b>		
Maximum	100.0	ha
Minimum	0.60	ha
Mean	18.51	ha
<b>3. Land Ownership of Rubber Plantation Area</b>		
Land title	32	26.70
Land use permission (Tax invoice)	80	66.70
Rent and concession	4	3.30
Land of relative	4	3.30
<b>4. Current Land Use</b>		
For Crop Productions	80	66.70
For Integrated Agricultural Production	40	33.30
<b>5. Number of Livestock in the Household</b>		
Poultry		
Maximum	100	head
Minimum	0	head
Mean	29.97	head
Goat		
Maximum	34	head
Minimum	0	head
Mean	2.20	head
Pig		
Maximum	14	head
Minimum	0	head
Mean	1.47	head
Cattle and Buffalo		
Maximum	35	head
Minimum	0	head
Mean	6.57	head
<b>6. Total Annual Household Income (From 1<sup>st</sup> of April 2007-31<sup>st</sup> March 2008)</b>		
Maximum	234,460,000	Kip
Minimum	1,470,000	Kip
Mean	44,901,000	Kip
<b>7. Total Annual Farm Income</b>		

<b>Some Economic Backgrounds</b>	<b>Frequency (n=120)</b>	<b>Percentage (%)</b>
(From 1 <sup>st</sup> of April 2007-31 <sup>st</sup> March 2008)		
Maximum	207,060,000	Kip
Minimum	0	Kip
Mean	24,120,100	Kip
8. Total Annual Non-Farm Income (From 1 <sup>st</sup> of April 2007-31 <sup>st</sup> March 2008)		
Maximum	88,344,000	Kip
Minimum	0	Kip
Mean	18,605,367	Kip
9. Total Annual Household Expenses (From 1 <sup>st</sup> of April 2007-31 <sup>st</sup> March 2008)		
Maximum	227,905,000	Kip
Minimum	2,457,500	Kip
Mean	53,676,976	Kip
10. Total Annual Agricultural Expenses (From 1 <sup>st</sup> of April 2007-31 <sup>st</sup> March 2008)		
Maximum	184,792,000	Kip
Minimum	65,000	Kip
Mean	23,665,540	Kip
11. Total Annual Non-Farm Expenses (From 1 <sup>st</sup> of April 2007-31 <sup>st</sup> March 2008)		
Maximum	148,835,000	Kip
Minimum	720,000	Kip
Mean	30,011,437	Kip

### *Discussions on Socio-Economic Backgrounds of Rubber Farmers*

The rubber farmers in the three parts had differences in some certain basic socio-economic backgrounds such as age, main occupation, education level, quantity of household labour, total land holding, total rubber production area, rubber production practice, farm and non-farm income, farm and off-farm expenses, and livestock production.

The rubber farmers in the northern part had the lowest average age then those in the southern and central parts 5 and 10 years respectively, because they are the fulltime farmers unlike in other parts which they just plant rubber plants for the future income when they are retired and for an extra income source. It indicated that the farmers in the southern and central parts were mostly governments and businessmen.

The northern rubber farmers had the limited education level comparing to those in other parts. They just had gone up to primary school. This is one of the major problems for them in access to production and market information. It is also affect the capacity in making a contract and bargaining process.

The rubber farmers in the northern province had the highest average household labour (almost 3 people/household) comparing to those in the

central and southern part. Thus, the capacity of the household to handle rubber production area without hiring external labour is approximately 7.5 ha per household. On the other hand, the farmers in the central and southern parts had the capacity to operate rubber production approximately 5 ha and 6.68 ha per household respectively, if they use just family labours.

According to the survey, the farmers in the northern province still have the capacity to plant more rubber trees. Now, the average production area is 4.60 ha per household. Nevertheless, they had limited land holding, which is very difficult to increase the production area, while the farmers in other parts have no problems on this issue. However, the farmers in the central and southern parts already planted rubber trees over the capacity their family can cope with. Therefore, they have to hire external labour during the harvesting.

The farmers in the northern part had sufficient labour, so they integrated some of the important cash crops with the rubber plantation such as rice, pineapple, banana, and soybean. The southern farmer had limited labour and most of them are not fulltime farmers, thus they did not have time to integrate the rubber plantation with other crops. They also just had to newly establish the rubber plants. This resulted in that they had significantly less farm income than other farmers in the central and northern parts. Therefore, the farmers in the southern part are based on off-farm income sources such as salary and small business.

The rubber farmers in the northern part are mainly based on agricultural production which is their main income source. However, they had very limited off-farm income. They are still implemented traditional production techniques which using minimum inputs. It indicated that they have very low expenses for agricultural activities comparing to other parts. The farmers in the southern province are in the investment phase, so they have relatively high investment in rubber production.

Traditionally, Lao farmers like to raise animals in their house for home consumption or sale when they need cash. The most common animal is poultry which is found in all three parts, while the large animals such as cattle, buffalos and goats are mostly popular in the central part, because the land is available for grazing. However, pig is the most important animal for rubber farmers in the northern province, because pigs are used for different traditional ceremony occasions.

## **4.5 Rubber Production Systems**

### *Production Characteristics*

Rubber plantation in Lao PDR is influenced by surrounding countries which share the border of each province. The northern provinces are mainly

influenced by China, whilst the central provinces are highly influenced by Thailand and the southern provinces by Vietnam. The three parts of Lao PDR have also different geographical characteristics. The northern part is mostly mountainous area, while the central and southern parts are flat plain and plateau areas respectively. Therefore, the production systems are different in terms of inputs such as varieties and cropping techniques.

*a) Northern Province*

In the north, the rubber plantation is mainly by small holder farmers. During the first 2-3 years, the farmers mainly plant stable food crops such as rice within the rubber plants. Some farmers plant other cash crops such as pineapple, soybean, and banana. The rubber trees are commonly planted with the spaces between 2m x 5m to 2m x 8m, 2.5m x 5m, 2.5m x 8, and 3m x 6m depended on the slope of land. The common rubber varieties plated were GT1 and RR1M600 which were brought from China. The labour used for the production is mostly by family labour.

**Figure 7: Integrated banana with rubber plantation in Luang Namtha Province**



*b) Central Provinces*

In the central part, the rubber plantation is by small holder farmers and businessman. The farmers plant stable food crops such as rice within the rubber plants during the first 2 years. The survey also found that some farmers raised cattle in the rubber plantation area when the rubber trees are ready to tap. The rubber trees are commonly planted with the spaces between 3m x 5m to 3m x 7m, 3.5m x 7m, and 4m x 6. The common rubber varieties are similar to what planted in the northern part such as GT1 and RR1M600,



but they were brought from Thailand. The labour used for the rubber production is partly family labour and hiring labour.

**Figure 8: Integrated rice with rubber plantation in Vientiane Capital**



**Figure 9: Integrated cattle grazing with rubber plantation in Khammuan Province**



*c) Southern Provinces*

The rubber plantation in the southern part is mainly by government employees. They just plant the rubber for the future income source and have not much time for taking care for the plants. Thus, they implement the mono-cropping system. The rubber trees are commonly planted with the spaces



between 3m x 4m to 3m x 7m. The common rubber variety is also RR1M600 which were brought from Vietnam. The labours used for the rubber production are mainly hiring labours.

**Figure 10: New planted rubber in Champasack Province**



#### *Reason to choose rubber production*

There are many reasons why the farmers choose to plant rubber. The majority of them (52 out of 120 farmers) had chosen rubber plantation because they had available land, while about 30 percent of them just followed their friends and relatives. 16.70 percent of the respondent farmers had chosen the rubber plantation, because it provides high profit, while few of them were encouraged by private sector.

#### *Knowledge and skill in rubber production*

More than half (59.67 percent) of the farmers did not receive any training in rubber production, while the rest 40.33 percent of the total had a training experience, which were supported financially by local government and a private company.

#### *Production experience*

The respondent farmers had been planted rubber in different times. The range is between 1 to 15 years old. The oldest rubber farmers are mainly in Luang Namtha Province. The average annual rubber production of each farmer is 2,763 kg, while the maximum and minimum annual production is 7,500 kg and 360 kg respectively. Two rubber farmers in Khammuan Province also harvested the rubber already, while the rubber farmers in the southern part such as Champasack Province had just established plants of only 2 years old.

### *Access to information sources*

Information sources on rubber production and marketing: The majority of them (60 percent) had got the rubber production and marketing from friends and relatives. The majority of the farmers also gain the production knowledge through that channel. 23.33 percent of the total respondents had obtained the information from private sectors such as businessmen. Only few of them had also obtained from the government sector such as Provincial and District Agriculture and Forestry Office.

### *Farmer Organization*

Different productions in different areas have a specific farmer group. Rubber production is a new agricultural activity in the country; therefore not many farmer organisations related to rubber production are established. Only in Hat Nhao village, a rubber group was organised by local authorities who consist of different members such as head, deputy heads, advisory, accountant and cashiers. The group is responsible for negotiations with traders in terms of price and quantity of rubber. However, the group is still weak in management capacity and implementation practices.

## **4.6 Production Investment Costs and Return**

The rubber tree can provide economical benefit from year 7 to 25. After that the production will be significant declining. Before harvesting the rubber resin, the farmers have a high investment input. The investment can be divided into two periods before harvesting such as during the first year and during year 2 to 6. After that the investment will be recovered during the harvest. Therefore, the investment is calculated in each period bases.

### *Investment in the first year*

The estimation of investment on rubber plantation in year 1 includes land clearing and preparation, planting materials, and maintenance costs as shown in the following table.

**Table 10: Estimation of investment on rubber plantation in year 1**

No	Items	Unit	Quantity	Prices (Kip)	Total (Kip)
1	Land clearing	Ha	1	1,000,000	<b>1,000,000</b>
2	Land preparation	Ha	1	1,500,000	<b>1,500,000</b>
3	Rubber seedling	Each	500	5,000	<b>2,500,000</b>
4	Planting Labour	Each	500	500	<b>250,000</b>
5	Barbed wire	Roll	16	150,000	<b>2,400,000</b>
6	Fencing Posts	Post	300	5,000	<b>1,500,000</b>
7	Fencing	Ha	1	700,000	<b>700,000</b>
8	Nails	Kg	2	10,000	<b>20,000</b>
9	Organic fertilizer	Kg	500	1,200	<b>600,000</b>
10	Pesticide	L	2	15,000	<b>30,000</b>

No	Items	Unit	Quantity	Prices (Kip)	Total (Kip)
11	Chemical fertilizer	Kg	120	4,000	<b>480,000</b>
12	Maintenance	Year	1	1,000,000	<b>1,000,000</b>
<b>Total</b>					<b>11,980,000</b>

Source: Interview with Rubber management and Development Unit, PAFO Luang Namtha Province.

For smallholder farmers that have limited investment funds will use family labour and discard some materials such as fencing. Therefore, the small holders who usually have family labour of 2-3 persons per household, will have the investment cost only for rubber seedlings, pesticide, chemical and organic fertilizer.

#### *Investment during year 2-6*

The investment from year 2-6 is all about maintenance of rubber trees and plantation areas. The maintaining activities will include weeding, pruning, and chemical and fertilizer application. Some necessary materials are also necessary such as materials fertilizers, chemicals, pesticides, and fungicides. The summary of the estimated expenses is illustrated in the table below.

**Table 11: Estimation of investment on rubber plantation from year 2-6**

No	Items	Unit	Quantity	Price (Kip)	Total (Kip)
1	Costs for maintenance	Year	5	1,000,000	<b>5,000,000</b>
2	Organic fertilizer	Kg	5,000	1,200	<b>6,000,000</b>
3	Chemical Fertilizer	Kg	925	4,000	<b>3,700,000</b>
4	Pesticide	Litre	10	15,000	<b>150,000</b>
5	Fungicide	Kg	150	10,000	<b>1,500,000</b>
<b>Total</b>					<b>16,350,000</b>

Source: Interview with Rubber Management and Development Unit, Luang Namtha Province

#### *The Investment from year 7-25*

Expenditures occurred from year 7-25 include maintenance costs, materials, and tapping equipments. The detail is illustrated in the table below.

**Table 12: Estimation of investment on rubber plantation from year 7-25**

No	Items	Unit	Quantity	Price (Kip)	Total (Kip)
1	Maintenance Costs	Year	19	1,000,000	<b>19,000,000</b>
2	Organic Fertilizer	Kg	10,000	1,200	<b>12,000,000</b>
3	Chemical Fertilizer	Kg	6,500	4,000	<b>26,000,000</b>
4	Pesticide	Litre	368	15,000	<b>5,520,000</b>
5	Tapping Costs	Day	2,280	30,000	<b>68,400,000</b>
6	Fungicide	Kg	570	10,000	<b>5,700,000</b>
7	Bowl/cup	piece	3,000	2,000	<b>6,000,000</b>
8	Tapping knife	Piece	18	30,000	<b>540,000</b>
9	Iron wire	Piece	3,000	100	<b>300,000</b>
10	Knife sharpening stone	Set	6	25,000	<b>150,000</b>
<b>Total</b>					<b>143,610,000</b>

Source: Field interview 2008

### *Estimation of rubber investment in 1 ha during the period of 25 years*

The estimation of rubber investment in Luang Namtha Province during the period of 25 years is 171,940,000 Kip/ha. However, rubber trees provide latex only 19 years.

1. Latex production yields 1,500 Kg/year/ha (one rubber tree can give latex production of 3 Kg/year/tree x 500 tree = 1,500 Kg/year)
2. Income is 1,500 Kg/year x 10,500 Kip/kg = 15,750,000 Kip/year (19 year x 15,750,000 Kip = 299,250,000 Kip)
3. Income from intercropping is around 1,800,000 Kip/year x 4 year = 7,200,000 Kip (127,310,000 Kip + 7,200,000 Kip = 134,510,000 Kip)
4. **Net profit** is (299,250,000 Kip + 7,200,000 Kip = 306,450,000 Kip)  
306,450,000 Kip - 171,940,000 Kip = **134,510,000 Kip/25 years/1 ha**

### **4.7 Problems and Impacts of Rubber Plantation on Farmers' Livelihoods**

#### *Problem Issues*

The respondent rubber farmers face some major problems in rubber production. The most common problem was pests and diseases, which destroy rubber trees. 43.33 percent of the total had faced this problem. 33.33 percent of them had faced difficulty in access to financial sources for investment. 16.67 percent still have insufficient knowledge and skill in rubber production, while some of them also have problem in marketing which relates to unstable price and production quality.

The farmers in the northern part such as Luang Namtha Province had planted rubber trees longer than other parts. They had faced different problems in relation to rubber production such as pest and diseases, access to investment fund, marketing, and product quality. The new rubber farmers in southern part had just established the crop for 1-3 years, so they still do not face much problem. Only few of them had problem with access to investment fund and knowledge in rubber production technique. (see table below).

**Table 13: The problem issues faced by the rubber farmers**

No.	Problem issues	Northern part	Central part	Southern part	Total (of 120 people)
1	Pests and diseases	32	20	0	<b>52</b>
2	Access to investment fund	16	16	8	<b>40</b>
3	Knowledge in production	4	8	8	<b>20</b>
4	Marketing	8	0	0	<b>8</b>
5	Product quality	4	0	0	<b>4</b>

### *Constraints*

The following are some general constraints related to rubber planting in Lao PDR:

- Lack of knowledge of rubber variety selection.
- Lack of access to information sources and information exchange on rubber.
- Lack of knowledge of suitable rubber variety for specific areas.
- Lack of funds to expand rubber plantation.
- Violence against land use regulation.
- Conflict among permanent resident and migrants.
- Insufficient water and electricity for rubber processing in their villages.
- Lack of knowledge of latex storage and processing practice.
- Low bargaining power among villagers and traders.
- No agreement between Lao Government and Chinese Government on rubber trade.
- Large area of concession effected to land use planning and land allocation.
- Research on rubber is still weak, because rubber is new issue for Laos and lack of rubber experts.

### *Impacts of rubber plantation*

The rubber plantation has impacts on both agricultural land and production. Half of the respondent farmers (60 people) said that the rubber plantation has an impact on their fallow land, and follow by upland rice field (48 people). The production also has impacts on horticultural, and animal grazing areas which are accounted for 28 and 16 people respectively. The respondents said that the lands were used to plant rubber trees. (See table below)

The northern and central provinces had the highest impact in decreasing fallow land and upland rice fields. This decreasing can contribute to the government policy on stop shifting cultivation by the year 2010.

The rubber plantation has also impacts on agricultural production such as upland rice, Maize, starch crop, vegetable, lowland rice, and fruit production. 28 people of the total said that their upland rice and corn production were declined after planting rubber, as the changed to plant rubber trees. 24 of them responded that the starch and vegetable crop production had reduced, while some of them also said had faced the reduction of lowland rice and fruit productions. (See table below for detail)

The most impact on the agricultural production was occurred with the northern rubber farmers, because the production areas had deceased and the

household labours were not available for other agricultural activities after implementing the rubber production.

**Table 14: The Impacts of Rubber Plantation on Small Holder Farms**

No.	Item	Number of Farms (of 30 people)															
		Decrease				The same				Increase				N/A			
		N	C	S	T	N	C	S	T	N	C	S	T	N	C	S	T
<b>I</b>	<b>Agricultural Land</b>																
1	Fallow land area	32	20	8	<b>60</b>	0	4	0	<b>4</b>	0	0	0	<b>0</b>	24	16	16	<b>56</b>
2	Upland rice Area	40	8	0	<b>48</b>	4	4	0	<b>8</b>	8	0	4	<b>12</b>	4	28	20	<b>52</b>
3	Horticultural Area	20	4	4	<b>28</b>	8	12	4	<b>24</b>	0	0	12	<b>12</b>	28	24	4	<b>56</b>
4	Pasture and grazing area	12	4	0	<b>16</b>	4	4	0	<b>8</b>	0	0	0	<b>0</b>	40	32	24	<b>96</b>
5	Paddy field	4	0	0	<b>4</b>	28	32	12	<b>72</b>	0	4	0	<b>4</b>	24	4	12	<b>40</b>
<b>II</b>	<b>Agricultural Productions</b>																
1	Upland rice production	28	0	0	<b>28</b>	12	8	0	<b>20</b>	8	0	8	<b>16</b>	8	32	16	<b>56</b>
2	Corn production	24	0	0	<b>24</b>	0	4	0	<b>4</b>	0	0	0	<b>0</b>	32	36	24	<b>92</b>
3	Starch crop production	24	0	0	<b>24</b>	0	4	0	<b>4</b>	0	0	0	<b>0</b>	32	36	24	<b>92</b>
4	Vegetable production	24	0	0	<b>24</b>	4	4	0	<b>8</b>	0	0	0	<b>0</b>	28	36	24	<b>88</b>
5	Lowland rice production	8	0	0	<b>8</b>	16	32	12	<b>60</b>	4	0	0	<b>4</b>	28	8	12	<b>48</b>
6	Fruit production	0	4	4	<b>8</b>	0	4	4	<b>8</b>	0	0	4	<b>4</b>	56	32	12	<b>100</b>

**Note:** N/A = the item is not available before and after rubber production

N: Northern Province

C: Central Provinces

S: Southern Province

T: Total

### *Advantages and disadvantages in rubber production*

According to the interviews, planting rubber can provide both advantages and disadvantages to the farmers. The farmers mentioned that the significant advantages of rubber production are increasing their income (88 people) and providing long-term secure benefits (32 people of the total). However, the major disadvantages are high labour inputs (40 of the total farmers), high initial investment requirement (24 of the total), slow economical return and impact on natural and agricultural resources especially cropping area (16 of each of them). In addition, few of them are also worry about unreliable rubber prices and limited knowledge in the production.

### *Affects of rubber planting on the land resources*

Most of the respondent farmers use there own land for rubber plantation. They use their existing fallow and upland areas which some of them are already allocated, while some of them are not. Few of them had land cessation agreements with the local government such as district and provincial levels for planting rubber in a large areas with up to 100 ha in young fallow land.



## **Conclusion and Recommendation**

### *Conclusion*

Rubber was one of the newest commercial crops introduced in Lao PDR during 1996. After that it was dramatically booming over the country after the rubber prices had significantly increased during 2003. Although the northern provinces are the mountainous areas, it has the second largest rubber plantation areas after the southern part. Central provinces are also increasing the production areas. The rubber production system is operated by different types of investments such as self investment and financial support from an investor. The contact systems were made by verbal agreements, informal written contracts and legally signed contracts.

There is some existing support to the farmers planting rubber such as financial support from the Agricultural Promotion Bank with a minimum interest rate. The government initiate some policies to eliminate slash and burn agriculture and establish a permanent crop. The government also initiate policies for poverty eradication by the year 2020, which farmers have to increase their income. Planting rubber trees is one of the promoted agricultural activities.

The price and marketing for rubber product is different according to geographical location. In the northern provinces, the rubber is marketed to China with the dominant the prices. The middleman also plays the important role in the marketing. However, it reduces the benefit of the farmers dramatically. One problem is that they have limited access to market information and bargaining power. On the other hand, the rubber product marketing in the central part is quite a high price, because they had access to the market information, thus giving greater bargaining power. The price of the rubber also depended on the quality and from of the product. In the north it was just dried in the soil and sold, while in the central part it was made in good shaped dried sheets before marketed.

The rubber farmers in the northern part had the lowest average age then those in the southern and central parts in 5 and 10 years respectively. They also had low education level which up to only primary school. In addition they have a very limited land area holding. However, they have higher household labour than other parts, while the rubber farmers in the central and southern parts have limited household labour comparing to the rubber production areas.

The rubber farmers in the northern part had very limited off-farm income. The farmers in all parts raised animal such as poultry, cattle and goats, and pig mainly for their home consumption.

It has been found that rubber plantation had some impacts on small holder farmers in terms of agricultural land and productions. However, it provides some positive support to the government strategy in stop shifting cultivation.

Rubber production seems to be good for long-term income, because rubber is a first priority product for Lao PDR it can be an income resource for national economy as well as income for farmers. The important things we should determine is the policy of land use planning for rubber investment to reach the high utilization for politics, socio-economic and environmental. In addition, it is a good condition for rubber planting in Lao PDR, because rubber markets are available such as: China market in the north, Thailand in the central, and Vietnam in the south.

### *Recommendations*

In order to improve the existing rubber production and reducing the impacts of both individual farmer and farmer organisation, it is recommended as follow:

#### *Northern Province*

- 1) Provide extension support on rubber production techniques and post harvest to improve the quality;
- 2) Provide technical support on pest and disease control;
- 3) Provide extension support on other agricultural production techniques which can integrate with rubber plantations to generate more income or secure the food during the start of planting;
- 4) Strengthen the rubber production group by providing capacity building skills for the group member in planning and management, accounting, and marketing;
- 5) Increase the role of the production group in the marketing process to reduce the middleman and increase the profit;
- 6) Prepare the crop calendar and planning for harvesting and marketing among the group members to reduce the over supply;
- 7) Set up a dry storage facility for added value to the rubber product;
- 8) Grade the product and apply a primary process to increase the value of the product before export;
- 9) Review the contract between farmers and the farmer organisation and the farmer organisation and the private trade company;
- 10) Consider to increase more rubber production areas for the farmers if it is possible; If it is not possible provide support on off-farm income generation for the rubber farmers, because they still have sufficient labour;

### *Central and Southern Provinces*

- 1) Establish rubber organisations or production groups with providing capacity building skills for the group member in planning and management, accounting, and marketing;
- 2) Provide extension support on rubber production techniques;
- 3) Provide extension support on other agricultural production techniques which can integrate with rubber plantations to generate more income or secure the food during the start of planting;
- 4) Grade the product and apply a primary process to increase the value of the product before export;
- 5) Set up a dry storage facility for added value to the rubber product during the rainy season;
- 6) Review the contract between farmers and the farmer and the private investment company;
- 7) Consider the process to hire labour for harvesting the rubber, because the rubber farmers in the central and southern parts have limited household labour.

### *Policy Recommendation for the Government of Lao PDR*

Based on the result of the study, small holders still need a lot of supports in terms of to enhance production capacity, quantity and quality, and marketing. Therefore, the government should consider some policies to support them as follow.

- Setting up an organisation or centre to be responsible for rubber research and development. This centre can be an all rubber information centre;
- Increase capacity for technical staff in rubber production, marketing, research and development;
- Ministry of Agriculture and Forestry should provide technical experts to support small holder rubber farmers;
- Identifying suitable land areas for increasing the production with minimizing environmental impact;
- Increasing added value to rubber products by processing in the country before export;
- Revising existing policies such as 2+3 policy, and land concession policy, because it may be adapted in one area, but not in others ;
- Allocating land to individual farmers;
- Land use planning for different economical agricultural production;
- Integrated farming in rubber plantation areas;
- Developing models for rubber groups and expanding into different part of the country;
- Increase the rubber processing facilities in different part to increase added value for the product.

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## **Annexes**

## ***Annex 1: The interview guideline for related key stakeholders***

### **Objectives**

1. To explore the existing policy support for farmers planting rubber, contract system between investor and producer, credit support for farmers, facilitation in terms of permission for rubber plantation and trade, different regulations including taxes; and
2. To make an analysis of the market options for farmers planting rubber and examine factors having an impact on market efficiency and analyze the market chain

### **Key Stakeholders (Target interviewees)**

- Concerned Government Officers in Central Government, Provincial Government, MAF, PAFO, DAFO, Tax and custom office, and trade office in provincial and district level.
- Rubber Farmers and Rubber Traders (seeds and latex)
- Financial institutions (Formal and informal)

### **Questions:**

#### **1. The existing policy support for farmers planting rubber**

- 1) What are the land concession policies for the rubber plantation?
- 2) What are the extension policies to support the farmers?
- 3) What are the marketing policies to support the farmers?
- 4) What are the policies to promote the investment on rubber plantation and business?
- 5) What are the land allocation policies to support rubber plantation?

#### **2. The contract systems between investor and producer,**

- 1) What are the contract systems between investors and producers?
- 2) What types of the contracts available?
- 3) How long does the contract last for?
- 4) What is the distribution of benefit in the contracts?
- 5) What are the benefits to the farmers by making the contracts?
- 6) What are responsibilities of each party in the contracts?
- 7) What are the punishment methods stated in the contracts if one of the parties had breached the contract?



### **3. The credit support for farmers**

- 1) What are the credit or financial support institutions available to farmers to plant rubber trees? (Formal and Informal)
- 2) What are the terms and conditions of the loan?
- 3) What are the interest rates?

### **4. The facilitation in terms of permission for rubber plantation and trade,**

- 1) What are the available facilities for rubber plantation and trade?
- 2) Who are responsible for the permission of plantation and trade?
- 3) What are the trade and marketing processes?
- 4) Who are involved with the processes?
- 5) How long does it take in each process?
- 6) How much fees and costs to operate in each process?
- 7) How much quantity and quantity of the latex to be traded?

### **5. The different regulations including taxes and making a market analysis**

- 1) What are the tax, custom, and associated fee rate for rubber plantation and trade?
- 2) How much benefit from plantation and marketing of the rubber production?
- 3) What are the problems associated with the rubber trade?

### **6. The market issues for rubber production**

- 1) What are the demand quantity and quality for the rubber product? (in time series)
- 2) What are the prices of the rubber since the last 5 years?
- 3) What are the market places and demand quantity for rubber product?
- 4) What are the marketing systems and processes?
- 5) If there is a contract, please describe the detail of the contract?
- 6) What are the market or trade chains of the rubber product?
- 7) How long does it take in each point of the market chain?
- 8) What are problems occurred in each point of the chain?
- 9) How much does it cost in each point of the chain?
- 10) How do you sell the product? In cash or credit?

## ***Annex 2: Interview Guideline for Field Trip to Yunnan Province, China***

### **Objectives**

1. To collect rubber production information in the border areas in China;
2. To investigate rubber trading and marketing in the Lao-Chinese border;
3. To identify current and future demand and supply for rubber in the border area.

### **Question Guideline**

1. What is the rubber production situation (areas, productivity, production, varieties, and price) in the border area of China?
2. What is the planned rubber production in China?
3. How is the rubber production marketed and traded from the farm in Lao PDR to a factory in China? Including:
  - The steps and processes,
  - Related stockholders, organizations and sectors in each level,
  - Implemented rules, regulations, policies and key decision makers,
  - Required documentation and time duration in each step,
  - Rubber price, fees and costs in each step
  - Rubber quantity and quality traded.
4. What is the previous and current rubber trading statistics?
5. What is the future demand for rubber product?
6. What is the rubber development plan in the border area of China?
7. What are the problems concerning rubber trading with Lao PDR? How do you address the problems?
8. What are your suggestion for improvement of rubber production and marketing to each key stockholder?

**Note: The interviewers should apply 5Wh + 1H Questions (Who, What, When, Where, Why, and How)**



5. Number of household members.....people.

No	Name	Gender	Age	Relative	Education level	Current Occupation
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

6. Number of household fulltime labour (between 15 to 45 years old) .....people.

7. Who is the main key decision maker in the family?

- 1).  Husband                      2).  Wife    3).  Both  
 4).  Other (Single or stay with parents)

8. Total land holding.....ha, Agriculture land holding.....ha

9. Land holding status

No.	Type of Land	Area (ha)	Land ownership status			
			Own land (Have Land Certificate)	Using permission (Have Tax Invoice)	Rent	Others (Relatives Land)
1	Lowland Rice		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Upland rice		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Garden		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Building and Construction		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Animal Raising		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Fruit Trees		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Rubber Tree		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Agar wood		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Others..... .....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Present land use.

- 1).  Cultivate crops (please specify.....)  
 2).  Raising animals (please specify.....)

3).  Both cultivating crops and raising animals (please specify.....)

4).  Others (please specify.....)

### 11. Animal Production

No	Type of animal	Quantity (heads)	Value
1	Poultry		
2	Goat		
3	Pig		
4	Cattle and Buffalo		
5	Water animal (fish; frog)		
6	Others.....		

### 12. Household Farm Equipments

No	Type of Equipment	Quantity	Value
1	Tractor		
2	Thresher		
3	Rice mill		
4	Pick Up Car		
5	Motorbike		
6	Other.....		

### 13. Total household cash income in last year (between 1/4/2007 to 31/3/2008)

#### 1.) Farm income

No	Source of income	Total income	Sale quantity (Kg, Tone, head )	Price/unit
1	Upland Rice			
2	Lowland rice			
3	Cereal crops			
4	Vegetable crops			
5	Fruit crops			
6	Fish			
7	Cattle and Buffalo			
8	Goat			
9	Pig			
10	Poultry			
11	Eggs (poultry)			
12	Others (please specify.....)			
	<b>Total farm income</b>			

2.) Non-farm income

No	Source of income	Cash (kip/year)
1	Salary	
2	Wages (please specify.....)	
3	Handicrafts (please specify.....)	
4	Business (please specify.....)	
5	Relatives include sons and daughter (please specify.....)	
6	Wild and water animals available	
7	NTFP (please specify.....)	
8	Rent (land, house, others...) (Please specify.....)	
9	Others (please specify.....)	
	<b>Total non-farm income</b>	

3).Total household cash income.....Kip.

14. Total household expenses in last year (between 1/4/2007 to 31/3/2008).

1.) Farm expenses

No	Item	Quantity/year (Kg, T, heads)	Unit Price	Total (Kip/year)
1	Land preparation			
2	Seed and seeding			
3	Fertilizers			
4	Chemicals			
5	Bio-fertilizers			
6	Livestock			
7	Feeds			
8	Vaccines and medicines			
9	Aquaculture			
10	Farm equipments			
11	Cultivation and planting crops			
12	Crops maintenance			
13	Harvesting			
14	Threshing			
15	Transportation			
16	Irrigation			
17	Fencing and housing			
18	Maintenance			
19	Others (please specify.....)			
	<b>Total farm expenses</b>			

2). Non-farm expenses

No	Item	Quantity/year (Kg, T, heads)	Price/unit	Cash (Kip/year)
1	Food consumption			
2	Clothes consumption			
3	Education expenses			
4	Health care expenses			
5	Traditional ceremonies (Basy, wedding)			
6	Gambling(lotteries)			
7	Electrical cost			
8	Land taxable			
9	Rent			
10	Interest on loan			
11	Others (please specify.....)			
	<b>Total non-farm expenses</b>			

3). Total household expenses.....kip.

## **Part 2: Rubber Plantation**

1. How large is your total rubber plantation areas? .....ha

No	Plot	Area (ha)	Age of the plants (year)	Plantation space (m x m)	Rubber Variety	No. of plants	Already harvest?
1	Plot No. 1						
2	Plot No. 2						
3	Plot No. 3						
4	Plot No. 4						
5	Plot No. 5						
	<b>Total</b>						

2. What is your plantation system?

- 1).  Mono Cropping System (rubber only)
- 2).  Mixed Cropping System (what crops?.....)

3. What type of land are your plantation areas?      1).  Flat land      2).  Sloping land

4. How much is the total annual rubber production?.....tonne or kg.

5. What are the prices rubber products?

- 1). Grade 1 or A .....Kip/kg
- 2). Grade 2 or B .....Kip/kg
- 3). Grade 3 or C .....Kip/kg
- 4). Do not know

6. How do you sell your rubber product?

- 1).  To a local broker
- 2).  To a broker from other country (Specify which country.....)
- 3).  To a processing factory (Specify.....)
- 4).  Others (Specify.....)
- 5).  Don't know yet



7. How did you know about rubber marketing information?

- 1).  Government
- 2).  Private Sector
- 3).  NGO and development projects
- 4).  Friends or relatives
- 5).  Others
- 6).  Don't know

8. Why decide to plant rubber trees?

- 1).  make a high profit
- 2).  see other people planted
- 3).  promoted by a company or business people
- 4).  Others (Specify.....)

9. How did you know about rubber plantation techniques?

- 1).  Government
- 2).  Private Sector
- 3).  NGO
- 4).  Friends or relatives
- 5).  Others(Specify.....)

10. Have you ever received training courses or taken study trips on rubber plantation?

- 1).  No
- 2).  Yes (How many times?....., About:
  - 1).....
  - 2).....
  - 3).....

11. Who had organized this training course?

- 1).  Government
- 2).  Private Sector
- 3).  NGO
- 4).  Others

12. What are the major problems have you faced in planting rubber trees?

- 1).  Skill and Knowledge
- 2).  Financial Investment
- 3).  Land access
- 4).  Rubber variety quality
- 5).  Pests and diseases (Specify.....)
- 6).  Marketing products
- 7).  Others (Specify.....)
- 8).  No problem

13. What are your investment funding sources?

- 1).  Self funding;    2).  Private Company;    3).  Bank.....;
- 4).  Others (Friend or relative...)

14. Please describe the details of the investment costs

No.	Item	Unit	Quantity	Unit cost	Total
1	Land Clearing				
2	Land preparation				
3	Seedling				
4	Planting				
5	Fencing				
6	Chemical or Organic Fertilizers				
7	Pesticide				
8	Herbicide				
9	Maintenance				
10	Harvesting equipments				
11	Harvesting				
12	Labour				
13	Transportation cost				
14	Marketing fee				
15	Land tax and rate				
16	Finical expenses (interest rate)				
	<b>Total</b>				

### Part 3: Impact of Rubber Plantation on Farmer' Livelihoods

1. How do the following items change after you had been planting rubber tree?

No	Item	Change Status				Change in Quantity	What are the major causes for the change?	How do you overcome the problems?
		Decrease	The Same	Increase	Not Available			
<b>A</b>	<b>Agriculture Areas</b>							
1	Paddy rice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
2	Upland Rice field	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
3	Garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
4	Field for feed animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
5	Fallow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
6	Others (please specify.....)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<b>B</b>	<b>Crop product</b>							
1	Paddy rice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
2	Upland Rice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
3	Corn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
4	Starch crops: cassava, sweet potato	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
5	Vegetables: cucumber, chili...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
6	Fruits: orange, mango, tamarind...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
7	Others (please specify.....)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

No	Item	Change Status				Change in Quantity	What are the major causes for the change?	How do you overcome the problems?
		Decrease	The Same	Increase	Not Available			
<b>C</b>	<b>Livestock product</b>							
1	Cattle and buffalo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
2	Coat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
3	Pig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
4	Poultry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
5	Others (please specify.....)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<b>D</b>	<b>Inputs for production</b>							
1	Financial expenses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
2	Labour input numbers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
3	Wages/salary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
4	Donation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
5	Land Value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
6	Vehicle and farm equipment rental	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
7	Transport cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
8	Agricultural production value in the local	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
9	Others (please specify.....)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

No	Item	Change Status				Change in Quantity	What are the major causes for the change?	How do you overcome the problems?
		Decrease	The Same	Increase	Not Available			
<b>E</b>	<b>Household Assets</b>							
1	Tractor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
2	Car	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
3	Rice mill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
4	Agricultural tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
5	Household facilities (furniture.....)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
6	Others (please specify.....)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<b>F</b>	<b>Others</b>							
1	Access to education	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
2	Road access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
3	Access to health care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
4	Available of NTFP quantity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
5	Access to other public infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
6	Conflict between farmers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
7	Others (please specify.....)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

2. Please express your ideas about rubber tree plantation

1) What are the 3 most advantages of the rubber plantation to you or your family?

1. ....
2. ....
3. ....

2) What are the 3 most disadvantages of the rubber plantation to you or your family?

1. ....
2. ....
3. ....

Your comments (if any)

.....  
.....  
.....  
.....  
.....  
.....

Remarks:

.....  
.....  
.....  
.....  
.....  
.....

Thank You Very Much for Your Kind Cooperation!



## Annex 4: Interview Pictures

