Food and Agriculture Organization of the United Nations

Pro-poor Policy Analysis on Rubber Production for Smallholder Livelihoods in Lao PDR

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By

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ABBREVIATIONS

ANRPC = Association of Natural Rubber Producing Countries
DAFO = District Agriculture and Forest Office
DAI = Division of Agricultural Investment (under DOPC, MAF)
DOPC = Department of Planning and Cooperation
GoL = Government of Laos
IRSG = International Rubber Study Group
Kip = Lao Kip
MAF = Ministry of Agriculture and Forestry
NAFRI = National Agriculture and Forestry Research Institute
PAFO = Provincial Agriculture and Forestry Office
RSS = Rubber Smoked Sheet

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EXECUTIVE SUMMARY

In Laos, the rubber plantation has booming since 2000s that influenced by the world demanding for rubber, particular huge rubber demand from China and India. While the market for Lao rubber is relied heavily on neighboring countries: China, Vietnam and Thailand. Therefore, government of Laos highly expected that local people would gain benefits from rubber plantation through selling latex and labor wages. Another benefit from the rubber plantation is often viewed as plant species that can be used to rehabilitate degraded land, and hence one of reason the government of Laos has promoted to achieve this objective.

However, the rubber price fluctuates and tends is depend on global rubber price. The price of rubber is highly fluctuated cause be global industry and economy growth, the natural rubber price increased to the peak of US$ 4,340/ton in 2010 and it was declined to US$1250/ton in 2015, this decline is extremely impact to Lao rubber price. While, the problem faced by rubber growers in Laos are limited access to fair markets, processing and marketing knowledge and skills; family labor shortage; limited access to post harvest technology (grading, low processing and storage facilities); impacts from natural disaster such as flood; lack of alternative income sources, mainly during 7 years before tapping latex; and high cost of seedling, equipment and lack of financial service.

The objectives of this paper are to review the existing rubber policies/strategies and its development interventions given by government and development partners from the perspective of smallholder farmer's inclusive and how to increase benefits for pro-poor and vulnerable groups. Thereafter, the report is mainly reviewed the impact of rubber production model on smallholder groups and found that there are three common management arrangements and investment models are currently being adopted in Laos, namely the individual farmers model with 27% or about 50,000 households are involved in rubber plantation, the contract farming model 24% and the concession model presents 49% of total rubber plantation in Laos. Laos is neighbor of the Association of Natural Rubber Producing Countries (ANRPC); this association is the biggest supplier (exporter) of natural rubber in the world with 93% of total world production in 2013. The three largest countries producing natural rubber in 2013 were Thailand, Indonesia and Vietnam.

The rubber price in three parts of Laos is different that depending on the product types, marking system and stakeholder involved in the supply chain. Most rubber smallholders in Laos process the latex into 'tub lump' with about 85% of total exported rubber and sheet rubber with only some of 15%. However, some of farmers processed block rubber (it is still in the form of raw latex rubber and similar to tub lump latex). While, rubber smallholders in Malaysia, Thailand and Sri Lanka processed and exported the latex in the form of sheet rubber. The price of sheet rubber is particularly higher than tub-lump rubber with approximately 20,000-24,000 Kip/kg, while the tub-lump rubber price was only from 5,000 to 9,000 Kip/kg.

The income of smallholder rubber farmers from the third year of tapping latex was 22.5 million Kip/ha/year and it also required intensive labor during the tapping latex for about 9 months per year. The income of farmers who in the rubber concession plantation found that the wage in the north higher than south and this group of farmers only rely on wage for their livelihoods, but though they often faces with competition labors from neighbor countries and unfair paid. The smallholders who practice the rubber plantation under contract farming have no problems with markets and capital for investment but they however are always exploited by unfair benefit sharing after selling products. The risk/vulnerability of smallholder rubber based on their role in value chain is highlighted as based on producer types:

Producer (individual invest):

1) Risk of production cost, the rubber smallholder often fact with high production cost of material and labor cost due to these costs are incurred throughout the life of rubber plantation.
2) Food insecurity, highly risk during the 3-4 years before tapping latex.
3) Income risk due to tendency towards single income source carries increased risk during no latex.
4) Financial risk for who have to pay interest rate, highly during 6 years before tapping.
5) Productivity risk due to low experiences and technique of rubber tapping, selecting an appropriate variety, latex storage and processing practices.
6) Market risks for rubber farmers who do not involve in the contract farming "2+3 and 1+4" due to rubber low bargaining power and limited market places and information, as currently rubber farmers only wait for rubber markets (buyers) come to their place to buy rubber latex.
7) No agreements between Lao and Chinese Governments on rubber trade.

Producers (Under contract farming):

1) As rubber rapidly expands into forest and livestock grazing areas, there is concern that relatively less well-off families depending on NTFPs for food and household income will have less option to ensure food security. The Loss of food and income sources from NTFP, and some community has risk in social conflict due to land use overlapping.
2) Food insecurity, highly risk during the 6 years before tapping latex due to all family members played high attention to the plantation then limited time to do other farmers such as vegetable and rice growing, animal husbandry and finding food. In some areas the rubber plantation was planted on rice fields and fallow areas. This could lead to increasing food insecurity and the loss of forested areas.
3) Income risk due to tendency towards single income source carries increased risk during no latex.
4) Labour shortage, mainly for families who have limited labour members.
5) Productivity risk due to low experiences and technique of rubber tapping, selecting an appropriate variety, latex storage and processing practices.
6) Become idle due to a lack of farming and foraging opportunities.
7) Unfair benefits sharing due to farmers have low education and misunderstand the contract.

Producer as Laborers (Concession):

1) Older and younger labors are often excluded from employers and make difficult to the families who based on wage for daily consumption. Especially, women are not allowed to bring young children to work. This makes employment difficult for women with small children.
2) Risk on education due to many children quit school to labor in the plantation to support their families, especially when their parents are unable to work due to their age or for other reasons.
3) Uncertain income due to heavily depend on a single income source (wage), non-permanent workers, the labor of working days per year was less than a quarter (three months) of the working year and labors are often hired on a piece work basis, thus making it very difficult for people to make a living through working on the rubber plantations. Some laborers have changed from being more or less-sufficient to becoming heavily dependent on rubber company labor.
4) Unstable, unfair, no standard and delay the wage payment in the rubber plantation (paid less then original agreed rates). This may cause to food insecurity due to 90% of income from wage will be spend for food what they consumes
5) There is the risk of losing job due to there are many neighbor country workers com to Laos and mostly Vietnamese workers, working on Lao rubber plantation in Southern provinces. Another reason is plantation owners do usually not tap the latex whenever the price of national latex is

down. There are no guarantees that farmers will receive temporary or permanent work in rubber concession areas. As based on several literatures estimated that the rubber production demand for labor may decline in the future due to the high skill labor will replace the number of low existing labors skills. In other reasons many rubber plantations have been clear cut and converted to grow other crops.

6) Rubber workers are frequently exposed to dangerous herbicides or other chemicals applied to the rubber plantations, causing various health problems.

However, those risks above can be solved by develop the mechanisms and policy support as below:

Institutional management

1) The cooperation mechanism among government agencies and actors along the value chain is needed to discuss and leaded by Ministry of Industry and Commerce.
2) Promote to establish the rubber production group or rubber association at regional level to assist rubber farmers access to market and strong in bargaining power.
3) Establishment a specific rubber committee or Lao rubber board to advice the development sector and production of rubber in Laos. Stakeholders from various sectors must integrate in the committee.
4) Set up a unit or agency at central and provincial level to respond and facilitate rubber strategic plan and to determine legislation and policies on the rubber production, promotion and marketing managements.
5) Establish the rubber extension service and demonstration center at regional level. For example, Technical facilitation service center and training center for smallholder rubbers in the Northern provinces.
6) Promote Laos to be a member of ANRPC due to it does not only provide and share the market information such as global and domestic price among the member countries but it also provides and shares the experiences and lesson learns of governance on rubber value chain, processing techniques, measurement of effective cost and rubber development strategy.

Investment Management

1) Government should issue the legislations or law on contract farming to ensure the benefit sharing between rubber smallholder and contractors.
2) Reconsider the land concession and should continue to ban the land concession for rubber production in Laos as based on decree of Prime Minister No. 13/PM, dated 11 June 2012.
3) The total area of rubber plantation in Laos is should not exceed than 350,000 ha, if not it will significant has a negative impact on other land use covers, namely forest covers, pasture land and other agricultural production areas.
4) The existing contract of rubber concession are needed to be reviewed and revised as based on regulation and provision of GoL on the concession fee no. 02/PM
5) If necessary to promote rubber plantation in future the '2+3' model is more appropriate due to avoiding intensive import labor from neighbor countries, market risk for smallholders and the contract must be under consideration of Lao rubber board.
6) In the contract or agreement license of rubber production, the policy of food security must be in

placed such as integrated farming, intercropping and agro-forestry systems should be considered within the development mix of options in order to reduce risk to smallholders on food and economics.

7) Investors should be provided with guidelines and standardized contracts, as Lao PDR lacks clear investment policies and guidelines.

Food Security

1) For poor farmers, especially the plantations don't tapping latex yet, the local government and rubber investors should find and allocate other farm or off-farm jobs to their householder members to work for food and wage. This may help the smallholder rubbers access to food and income.
2) For future plantation, the smallholder rubber should not use all land area to plant only rubber (mono-cropping) and must be keep the areas to grow agricultural crops or intercropping in the rubber plantation during 1-3 years. This is to help farmers in food security during 7 years without income from latex.

Financial and Marketing

1) Finance and credit are extremely important aspects of the package for smallholders credit mechanisms need to be integrated into the rubber development plans from the outset.
2) The importance of favorable credit support systems have been clearly demonstrated in the analysis of current rubber systems in Laos and without this support, the economic capability of smallholder rubber producers would be turned to risk and vulnerability.
3) Formulation of the production group, buyer group for smallholder rubber farmers and to be member of rubber organization that can help them to access market and other necessary information on rubber. In addition, the production group will bring the individual farmers who have no contract farming or no promising marketing
4) Establishment of rubber bank to subsidize and stock the rubber product when the price increase, the government will responsible for initiative period and after that will hand over to private sectors.
5) The PPP (Public Private Partnership) model must be applied to support the existing smallholders rubber farmers and private sectors to install the rubber processing factories both semi processing and modern (final product) processing factories such as tyre factory and other products that use natural rubber as main input
6) The public banks: Nayobai Bank and Agricultural Promotion Bank would provide the low or appropriate interest rate to smallholder for their basic investment on processing of sheet rubber must be promoted to practice in smallholder household level.
7) Reduce the uncertainty of rubber latex market at village level through: 1) promising marketing between private buyers (companies) and production group in the village and 2) direct contracts between rubber production group and processing factories from neighboring countries (along the borders)
8) As currently the rubber latex exports to China are mostly informal trade, the Ministry of Industry and Commerce should lead to make actively negotiation with China to include the rubber latex into

the list of ASEAN Tread in Goods Agreement (ATIGA), which already covers five crops (corn, watermelon, banana, dry cassava and rice).

9) The sheet rubber must be promoted to practice in smallholder household level. To do so, the strengthening microfinance is important tool to improve access to finance of small plantation farmers. In addition, District Agriculture and Forestry Office should provide rubber processing technical training to farmers before getting loans in order to guarantee the effectiveness of credit utilization.

Labor Management

1) The public sector should develop and promote the technical labor skills, which determine policies and regulations with the large-scale rubber investment of both domestic and international companies. The raw labors (no experience on tapping latex labor) are needed to train on the technique of tapping that could help them to competitive able with labors from neighbor countries.
2) The public sectors (Provincial of Agriculture and Forestry Office, and Provincial of Labor and Social Welfare Office) should formulate the development center skill on rubber tapping to organize training and facilitate to smallholder farmers. This center might be located in the extension service centers
3) For the Northern provinces is in high risk of labor shortage, thus may need to import labors from neighbor provinces and it is necessary to work integrating with the labor and social welfare sector at all levels.
4) The labor law is needed to disseminate to the rubber investors and the law can represent a powerful tool for Lao labor protection.

Environment issues

1) The rubber plantation should apply the agro-forest technique to their rubber plantation to improve the biodiversity in the plantation areas
2) Smallholder rubber farmers should build the latex storage to protect air pollution in the community
3) The plantation is must far from the water sources at least 50-100 m to avoid the waste or chemical drain into water source
4) Up to now lack of evidence on negative impact of rubber plantation on environmental issue, thus it is necessary need to conduct survey and evaluate the environmental impact to soil, water, air, biodiversity, human and community. The result of evaluation will provide guideline and measurement to address the problems.
5) Establish investor protection and improve investment climate: It is easy to blame investors for unsustainable practices. However, a precarious investment climate is equally responsible. Almost all Chinese investors, for example, report fears that the Lao government as well as villagers will change policies or revise on contracts. When investors are unsure about the long-term security of their projects, their priorities are to make quick gains and they are less motivated to invest in the sustainable development of rubber.

I. INTRODUCTION

1.1 Background

The Government of Lao PDR has set a target for GDP to grow by at least 8% per annum, of which the agriculture-forestry sector is expected to grow at an annual rate of 3.5% until 2025, thus reducing its share to 23% of the GDP by 2015. To achieve the goal, Ministry of Agriculture and Forestry (MAF) recently formulated an Agricultural Development Strategy (ADS) to 2025, and Vision to 2030. The ADS provides the framework, vision and long-term development goal for ensuring national food security and sustainable development of the agriculture, forestry and natural resources sector. The ADS recognizes rubber as a strategic agriculture product contributes to the economic development of Laos.

Since 2000s, the rubber plantation has booming due to the world demanding for rubber, particular new demand Chinese's expending economy has booted market prices. The government of Laos expected that local people would gain benefits from rubber plantation through increasing investment rate. It needs to be considered that rubber plantation needs at least seven years before harvesting in which farmers would have to seek alternative sources of income. While the market for Lao rubber is relied heavily on neighboring countries (China), the rubber price fluctuates and tends to decrease dramatically in recent years. On the other hand, there might be possible negative impacts regarding social, economic and ecological balance with the risks and vulnerability of farmers who are living in traditional livelihood systems. In order to support Laos implementing the rubber development policy in sustainable manner, FAO needs a service of a National Consultant to review the existing rubber policy/strategy and its development interventions given by government and development partners from the perspective of smallholder farmer's inclusive and how to increase benefits for pro-poor and vulnerable groups.

Therefore, this work is a part of the "Pro-Poor Policy Approaches to Address Risk and Vulnerability at the Country Level (GCP/RAS/276/IFA & TCP/RAS/3405)" is a regional project jointly supported by FAO and IFAD. The project is cooperating with the Ministry of Agriculture and Forestry (MAF), particularly National Agriculture and Forestry Institute (NAFRI) to implement the activities. The aims of this report are to review and analyze data from a member of publications on rubber production in Laos, existing rubber policies, strategies of Lao government and it benefits for pro-poor and vulnerable groups. It also aims to summaries the driving forces behind current trends, draw conclusions and make policy recommendations towards building a sustainable pro-poor rubber industry in Lao PDR.

1.2 Rationale

The rubber is one of the prioritized commercial crops, which had been booming very fast. However, smallholder farmers still face many significant difficulties and challenges in rubber plantation. A number of factors such as inputs, production, and marketing can cause smallholder rubber production having low productivity and quality. Access to suitability, quality, and sufficient inputs is difficult by smallholder rubber farmers in rural areas. In most cases, during the production period, the smallholder rubber farmers regularly face the problems:

1. Access to production, processing and marketing knowledge and skills.
2. Family labor shortage, because of labor migration.
3. Limited access to post harvest technology e.g. grading, processing and storage.

4. Impacts from natural disaster such as flood.
5. Lack of alternative income sources.
6. High cost of seedling and fertilizers and lack of financial service.

1.3 Objectives and Outputs of the Policy Study

- Analysis Impact of Rubber Production on pro-poor livelihood (changes in term of economics)
- Provide policy recommendation/brief

1.4 Scope of study

The FAO terms of reference (TORs) states the scope of services as to conducts synthesis rubber production documents which objective to analyze impact of rubber production on pro-poor livelihood (vulnerability group). The synthesis is required to:

1. Collect and compile policies, reports, and statistics related to rubber plantation with a focus on commercialization and pro-poor livelihood changes of rubber from various organizations (Government, Development Partners/Development Projects, NGOs, etc.).
2. Identify and facilitate for key stakeholders having a shared vision on the key factors influence to the sustainable livelihood of smallholder farmers in the rubber value chain.
3. Review existing policies (including programme and implementation of actions already in place).
4. Identify issues/challenges and provide recommendations (i.e. progammes and policies/sub-sector policies to be developed) to address risk and vulnerability including issues/gaps/challenges.
5. Draft the synthesis on Rubber plantation for commercialization and livelihood change.
6. Revise the first draft based on the comments and feedbacks from the initial technical consultation.
7. Finalize the synthesis report based on the comments and feedbacks from the final technical consultation.

1.5 Approach

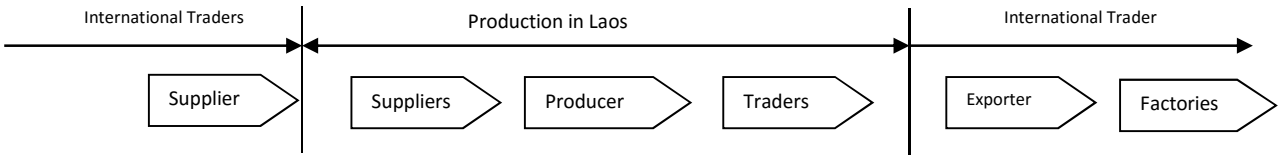
1.5.1 Value chain approach

The value chain concept was developed and popularized in 1985 by Micheal Porter. He defined “value” as the amount buyers are willing to pay for what a firm (producer) provides, and he conceived the “value chain” as the combination of value added activities operating within a firm-activity that works together to provide value to customers. The value chain was also defined by Heiko Bammann (2007) as the full range of activities, which are required to bring a product or service from beginning, through the different phases of production, delivery to consumers, and final disposal after use. In addition, Baker, D. (2006) has defined the value chain concept as a tool to trace product flows, show value additional at different stages, and identify key actors and their relationships in the chain. However, several scholar uses the term of ‘value chain’ and ‘supply chain’ is the same approach in the chain. For example, Feller A. et al (2006) defined “a supply chain and a value chain” are complementary views of an extended enterprise with integrated business processes enabling the flows of products and services in one direction. Feller A. confirmed that supply chains and value chains are not different entities. Therefore, this chapter we used the term of “value chain”.

This work we use a value chain approach due to it provides us to understand the role of actors/stakeholders involve in each stage along a rubber chain because the sustainable of value chain is the functioning markets. In case of natural rubber chain in Laos, the value chain of latex from farmers to exporters is only passed by the simply activities and not many stages involving in the chain compare to other crops. Figure 1 shows the flows of rubber production in the Laos from the input suppliers, producers to traders and exporters inside the country.

In generally, in Laos there are three main rubber latex producers that including smallholder (who only has a role to grow rubber on their own land and tapping latex), private company (who is a domestic firm as usually act as a input supplier, producer and raw latex buyer) and land concession (international). The foreigner investment company (land concession) usually have four roles as input supplier, producer, raw latex buyers and exporters. This study will not deeply study the cost occurring throughout the chain and will only focus on the scope of value chain in the domestic.

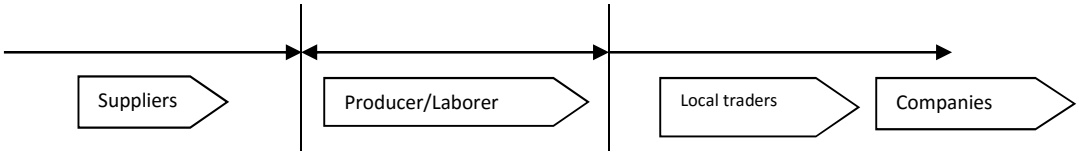
Figure 1: Rubber Value Chain in Laos



Source: Author, 2016.

Figure 2: Rubber Value Chain of Smallholder in Laos

The figure 2 indicates the role of smallholder rubber is only acts as a producer and supplier of latex to other firms such as local traders who collect raw rubber latex and sometime smallholder sells their rubber latex directly to the domestic and international companies. In addition, another role of smallholder in the rubber production is to provide labour through wage of incentive. The detail is explained in the section 2.7.2 (page 36).



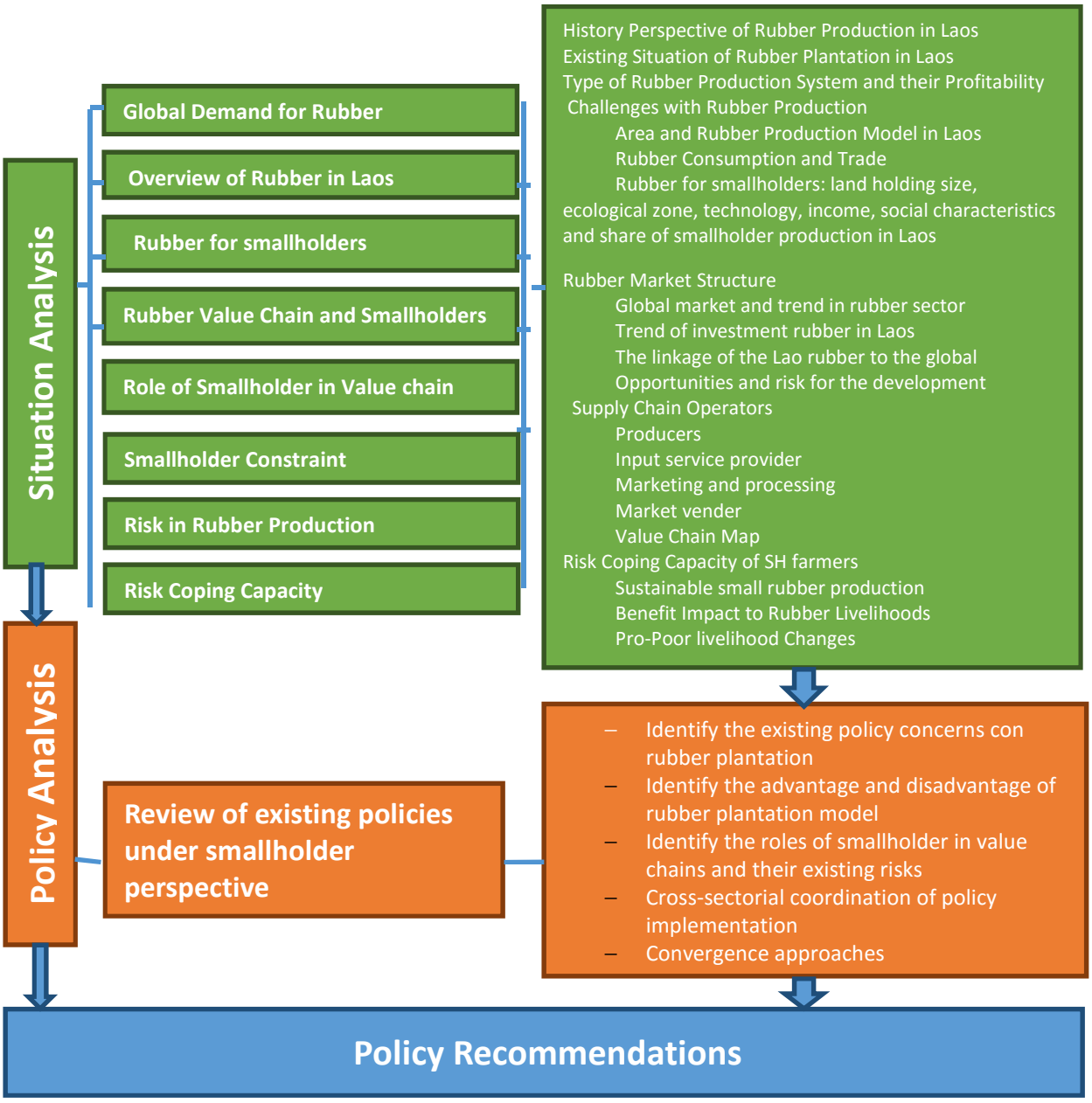
Source: Author, 2016

1.5.2 Inclusive pro-poor orientation and policy

The implementation of pro-poor policies clearly depends upon the political economy implications of the process. This work applies pro-poor policy along with value chain of rubber production to understand who are the advantage and disadvantage. For economic policies to be focused on poverty reduction governance structures need to be effective in achieving this objective. And to make such structures effective, broad pro-poor associations are necessary.

1.6 Visualization on Conceptual framework

Figure 3: Conceptual Framework of Rubber Policy Synthesis



Source: Author, 2015 (based on materials from FAO's TOT training, Bangkok, Thailand 2015)

1.7 Methodology

This study is to synthesis the previous works of rubber production in Laos and including policy and statistics that related to rubber production and the end of this report is to provide recommendation for further policy recommendation for short and long terms of rubber production in Laos.

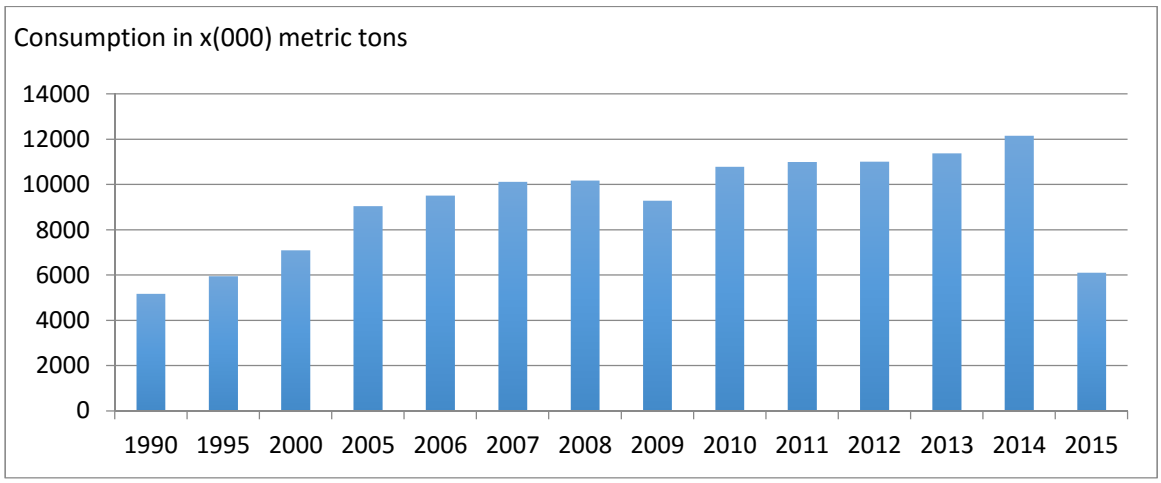
II. SITUATION ANALYSIS

2.1. Global Demand for Rubber

The global demand for rubber production has increased dramatically over the past several years predominantly due to growth in the Chinese and Indian economies (Douangsavanh et al, 2009). The world rubber consumption has increased at an average rate of 5.9% per annum since 1900 to about 7.81 million tons in 2003 for natural rubber. With strong and robust economic growth, China exceeded the United States and Japan as the world's number one consumer of rubber in 2002 with estimated demand of 3.45 million tons or 18.2% of global consumption (Jumpasit, P. 2004).

Global consumption of natural rubber declined by 8% in 2009, as a result of the economic downturn, but quickly recovered in 2010. Growth since then has been about 1–2% per year (see figure 4). This statistic shows the global consumption of natural rubber in 1990, around 5.18 million metric tons of natural rubber was consumed worldwide. This amount increased to almost 11.4 million metric tons in 2013 and 12.1 million metric tons in 2014, for the 2015 shows only first quarterly data.

Figure 4: Global Demand for Natural Rubber



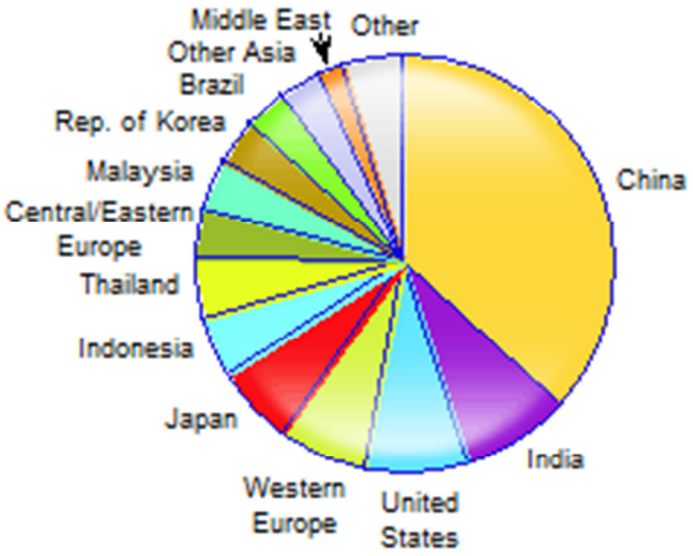
Source: http://rubberboard.org.in/rubberprice.asp?url=internationalrubberprice.asp and http://www.statista.com/statistics/275399/world-consumption-of-natural-and-synthetic-caoutchouc/

It is predicted that China will increase its vehicle fleet from the current level of 10 million to 200 million by 2020, as household incomes rise and over 20,000 kilometres of new roads are built. According to the International Rubber Study Group (IRSG), the world total rubber demand is forecast to increase at 1.8% and 4.1% in 2015 and 2016, respectively. The global demand for natural rubber is expected to increase by 3.1% in 2015 under the IMF Scenario, and by 4.4% in 2016. World synthetic rubber demand is expected to increase to 16.8 million metric tons in 2015 and rise to 17.5 million metric tons in 2016 under the IMF Scenario (world rubber week, Singapore, March 2015). However, the recent predictions of IRSG, in the global economic recession, the demand for rubber in general will slow down; the reduction speed will be about 2.1% per year from 2013 to 2015 and around 1.9% by 2020. With the trend of using environmentally friendly products, it is forecast that the demand for synthetic rubber consumption will rise only 1.6%/year, meanwhile natural rubber consumption will increase by 3.2%/year (world rubber week, Singapore, March

2015). The fact this, the dropping rubber prices, due to oversupply, continue to impact the world's leading rubber-producing countries in Southeast Asia.

According to the website[1] of rubber board reveals that the demand for rubber (both natural and synthetic) is a close correlate of overall economic growth and industrialization, in particular the growth of the automotive sector and the65-70%of total rubber use is for tyre. The shift toward radial tires has resulted in an increase in natural rubber consumption over the past 35 years. Natural rubber accounted for about 30% of total world consumption of rubber in 1981; the share increased to about 42% in 2013. Increased rubber consumption in the natural rubber–producing countries has also been a factor, as well as the greatly increasing demand for natural rubber in China and India. China continues to be the largest consumer of natural rubber in the world; accounting for 33% of the world consumption of natural rubber (China uses most (80%) of its natural rubber for tire manufacture). For the developed regions (the United States, Western Europe and Japan) will grow at less than 1% per year, while developing regions in South America and Asia will grow at 3–5% per year(see figure 5).

Figure 5: World Consumption for Natural Rubber in 2013



Source: https://www.ihs.com/products/natural-rubber-chemical-economics-handbook.html

However, according to the literature reviews the recent trends in world natural rubber production include the following factors:

1. Growth in production (supply) exceeds growth in demand and a great surplus has emerged.
2. Production is dominated by Southeast Asia and is primarily for export.
3. Estates have switched away from natural rubber production to palm oil production, so natural rubber is now predominantly a smallholder crop.

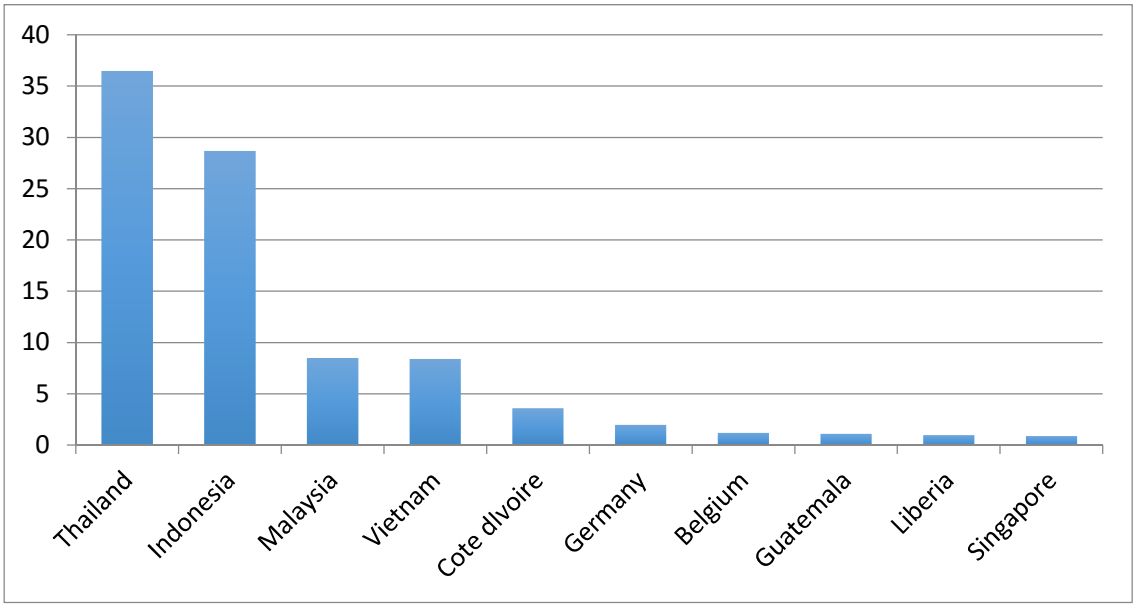
[1] http://rubberboard.org.in/rubberprice.asp?url=internationalrubberprice.asp

4. Production acreage has increased in Vietnam, Laos, Cambodia, Burma (Myanmar) and West Africa.
5. Thailand's political crisis has affected the supply of natural rubber.

2.2 Global Supply of Rubber

The biggest supplier of natural rubber is from the Association of Natural Rubber Producing Countries (ANRPC)[2]. The membership is the governments of countries producing natural rubber. The association has produced natural rubber accounted for about 97% of the global supply in 2006 (Saykham V. et al, 2009)[3] and decline to 92% 2010 (ANRPC, 2015), and according to the website of IHS (2015)[4] reports that, Asia continues to dominate the world supply of natural rubber, with 93% of total world production in 2013. The three largest countries producing natural rubber in 2013 were Thailand, Indonesia and Vietnam. Thailand has been the world's largest producer of natural rubber since 1993, accounting for 34% of world production in 2013, with Indonesia accounting for 26%. Vietnam is the new third-largest producer countries. Malaysia used to third-producer countries, which accounted for 32% of world production in 1988, has shifted its emphasis to other crops and nonagricultural investments and produced only 6.9% of the global rubber by 2013. According the world export website shows that Thailand shows the biggest shared of natural rubber exports countries, which highest value for export of US$6 billion annually and shared 40% of total world exported in 2014, followed by Indonesia, Vietnam, Malaysia, other countries, see figure6.

Figure 6: Sharing of Natural Rubber Exports by Country



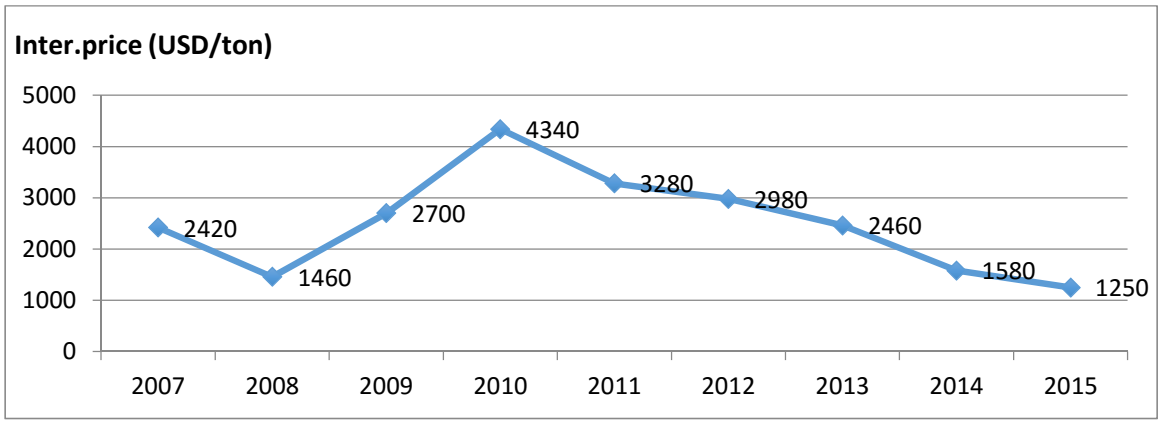
Source: http://www.worldstopexports.com/natural-rubber-exports-country/3354

[2]The ANRPC has 11 Members: governments of Cambodia, China, India, Indonesia, Malaysia, Papua New Guinea, Philippines, Singapore, Sri Lanka, Thailand and Vietnam and it is an inter-governmental organization established in 1970
[3]Rubber investment and market linkage in Laos: approaches for sustainability, March 2009 (LAD 21)
[4] https://www.ihs.com/products/natural-rubber-chemical-economics-handbook.html

2.3 Global Price for Natural Rubber

The price of rubber fluctuates as link to socio-economic development factors in globally. During the period of the Asian economic crisis from 1995 to 2000, the average market price for natural rubber decreased from US$1,490 per ton in 1995 to about US$490 per ton in 2002, an average annual decline of 13.3% during the period. However, with the strengthening global economy, the price for natural rubber has improved since 2002, reaching US$1,900 per ton by 2007, representing a significant average annual growth rate of 57.7% over this five year period; 2007 saw the highest rubber prices in 12 years (Douangsavanh et al, 2008).However, the price for natural rubber declined rapidly again in the second half of 2008, when financial and economic crises in the United States, United Kingdom and Europe began to affect the global economy. The natural rubber price increased again in 2009 and 2010 reaching to the peak of US$ 4,340/ton reached to the peak in 2010 that because the demand for rubber (both natural and synthetic) is a close correlate of overall economic growth and industrialization. Nevertheless, the price of rubber was declined again since 2011 and downed to US$1250/ton in 2015; this decline is mostly closed to the price in 2008 (see figure 7). Currently, there is a surplus of natural rubber in the world market, which has reduced prices extremely.

Figure 7: Rubber International Price



Source: http://rubberboard.org.in/rubberprice.asp?url=internationalrubberprice.asp

According to Bangkok Post Newspaper (dated 11 January 2016) presented the Thai rubber farmers step up pressure as prices plummet due to the raw rubber sheets were 957.6 USD/ton while RSS3 was 959 USD/ton on 7 January 2016, down 0.20 baht/kg and 0.39 baht/kg or 5.62USD/ton and 10.96 USD/ton respectively in line with global oil price. Other factors affecting the prices are the slugging Chinese economy, as well as geopolitical tensions in the Middle East and the Korean Peninsula. In order to solve that problems Thai rubber farmers urged the government to provide temporary relief by guaranteeing a price of not less than 60 baht/kg or about 1,687.5 USD/ton. The rubber price plummet in Thailand is assumed that the will extremely affect to the rubber price in Laos as immediately.

2.2. Overview of Rubber Industry in Laos

2.2.1 Background of rubber promotion in Laos

The promotion of rubber by the Government of Laos (GoL) is seen as a tool for eradicating shifting cultivation throughout hilly and mountainous parts of the country (Shi 2008). It is also viewed as a tool for introducing neoliberal economic practices, including capitalizing land resources and using them to generate state revenue, and more generally supporting Laos' production and long-standing promotion of foreign exports (Harvey 2005). For most plantation investors, the main attractions of Laos are the low cost of land access, the perceived availability of large pieces of land, the availability of cheap labor and the close closeness of Laos to major markets (China). Even though the vast majority of land in Laos is used regularly by villagers to meet their livelihood needs, Lao development discourses frequently promote the myth that there is plenty of 'empty space', 'unused land' and 'untapped resources' available for foreign investors to exploit in Laos (Ian G., 2010).

The investment in rubber have several ways and mainly come through joint ventures between private foreign investors and private Lao investors, or as investments with 100% foreign ownership. However, there are number of researchers found that the large-scale rubber plantations in Laos are clearly having a massive and rapid impact on landscapes and livelihoods. Schipani (2007) has written about some of the conflicts that have emerged between rubber plantation development and biodiversity protection inside Lao National Protected Areas, and Chamberlain (2007) has reported that large rubber concessions have contributed to increasing poverty amongst poor groups, especially ethnic minorities living in upland area. However, many researchers do greed that the smallholder farming families have high potential benefit to farmers than large scale. The example of Hat NyaoVillage in Luang NamTha Province indicates that smallholder farming families have the potential to benefit economically from the development of small-scale rubber plantations (Manivong and Cramb 2008; Alton et al. 2005).

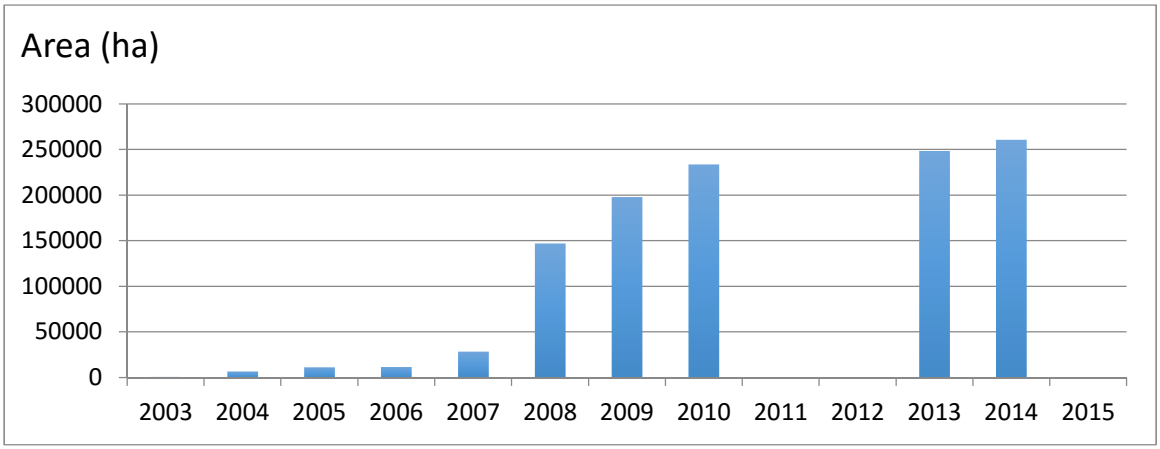
2.2.2 Area of rubber production in Laos

Over the past decade, the area planted with rubber trees in Laos has expanded rapidly from approximately 900 ha in 2003 to 28,574 ha in 2007 (Douangsavang, Thammavong, and Noble 2008). According to the Lao Agriculture Census 2010/2011 revealed that the number of farm households with rubber growers was about 49,000 households under area of 66,000 ha (LAC 2010/2011). It reaches an estimated 261,000 ha in 2014 (Vientiane Times 2014). In Northern Laos, Chinese companies are the main investors and are establishing monoculture rubber plantations in contract farming and concession the public land (like arrangements) (Alton, Bluhm, and Sananikone 2005; Manivong and Cramb 2008; Shi 2008; Thongma-nivong et al. 2009). Chinese investment in rubber increased rapidly from the mid-2000s as part of a wider phenomenon of transnational enclosure motivated by Chinese international development policy, which encourages overseas investment, trade and migration ('zouchuqu' – 'to go out') (Shi 2008; Cohen 2009). At this time, the demand for natural rubber to fuel national industrialization had increased, while the production of rubber within China had stagnated and was constrained by limited land resources (Alton, Bluhm, and Sananikone 2005; Shi 2008; Cohen 2009).

Global prices for natural rubber were rising and were predicted to continue to increase over the next decade (Vongkhamor et al. 2007; Manivong and Cramb 2008; Douangsavang, Thammavong, and Noble 2008). Chinese rubber plantations in Laos are promoted as development projects and opium replacement strategies targeting sources of illegal drugs into China (Shi 2008; Cohen 2009). Chinese companies are

therefore subsidized with loans and tariff exemptions by the Chinese government. Since 2003, the rubber plantation area has increased rapidly from 900 ha (2003) to 28,000 ha (2007), 248,840 ha (NAFRI, 2013) and 261,000ha in 2014 (PAFOs, 2015) in which 51% in the north, 21.5% in the central and 27.3% in the southern part of Laos. See figure 8 and table 1.

Figure 8: Area of Rubber Production in Laos by year



Source: NAFRI, 2011 and Statistic Yearbook of DOPC, 2014

Note: No data for 2011 and 2012.

Table 1: Area of Rubber Plantation in Laos by Province (2013)

Province	Plantation area (ha) by types in 2013			Total cultivated area
	Individual	Contract	Concession	
North	**39,843.28**	**51,193.80**	**32,450.28**	**123,487.36**
Phongsaly	5,974.96	9,352.56	2,513.24	**17,840.76**
LouangNamtha	16,409.00	3,557.00	13,298.00	**33,264.00**
Bokeo	10,656.00	13,548.00	1,018.00	**25,222.00**
Xayaboury	1,205.32	7.2	-	**1,212.52**
Oudomxay	2,567.00	24,726.00	1,000.00	**28,293.00**
Louangprabang	3,031.00	-	14,621.04	**17,652.04**
Huaphanh	-	3.04	-	**3.04**
Xaysomboun	-	-	-	**-**
Central	**22,613.80**	**2,446.00**	**29,650.39**	**56,176.57**
Vientiane C.	NA	NA	NA	**1,466.38**

Province	Plantation area (ha) by types in 2013			Total cultivated area
	Individual	Contract	Concession	
Xiengkhouang	123.5	-	-	**123.5**
Vientiane	10,539.00	2,446.00	10,263.00	**23,248.00**
Bolikhamxay	7,106.79	-	5,520.00	**12,626.79**
Khammouan	4,207.42	-	1,312.08	**5,519.50**
Savannakhet	637.09	-	12,555.31	**13,192.40**
South	**4,376.00**	**5,034.41**	**59,772.51**	**69,182.92**
Salavanh	-	230.41	5,622.79	**5,853.20**
Champasak	4,307.00	4,804.00	24,742.00	**33,853.00**
Sekong	69	-	7,399.72	**7,468.72**
Attapue	-	-	22,008.00	**22,008.00**
Total (ha)	**66,833.08**	**58,674.21**	**121,873.18**	**248,846.85**

Source: NAFRI, 2013

In 2013 the rubber plantation in 14 provinces have providedlatex, for the north provinces include: LouangNamtha, Bokeo, Oudomxay, Phongsaly, Louangpabang and Xayaboury; central provinces: Bolikhamxay, Viengtiane, Khammouan and Vientiane Capital; South provinces: Champasak, Salavanh, Sekong and Attapue, which the total harvested area 35,960 ha (North: 8,230ha, Central: 7,470 ha and South: 20,250 ha). The average productivity in the north is about 1.86 ton/ha/year, Central about 2 tons/ha/year and South 0.7 tons/ha/year (NAFRI, 2013). See the table 2:

Table 2: Harvested Area of Rubber Plantation in Laos by Province (2013)

Province	Harvested Area (ha) by types in 2013			Harvested Area (ha)
	Individual	Contract	Concession	
North	2,206.07	975.00	200.00	8,236.07
Phongsaly	28.60	6.00	-	34.60
LouangNamtha	NA	NA	NA	4,855.00
Bokeo	1,969.00	770.00	-	2,739.00
Xayaboury	3.47	-	-	3.47
Oudomxay	200.00	199.00	200.00	599.00
Louangprabang	5.00	-	-	5.00

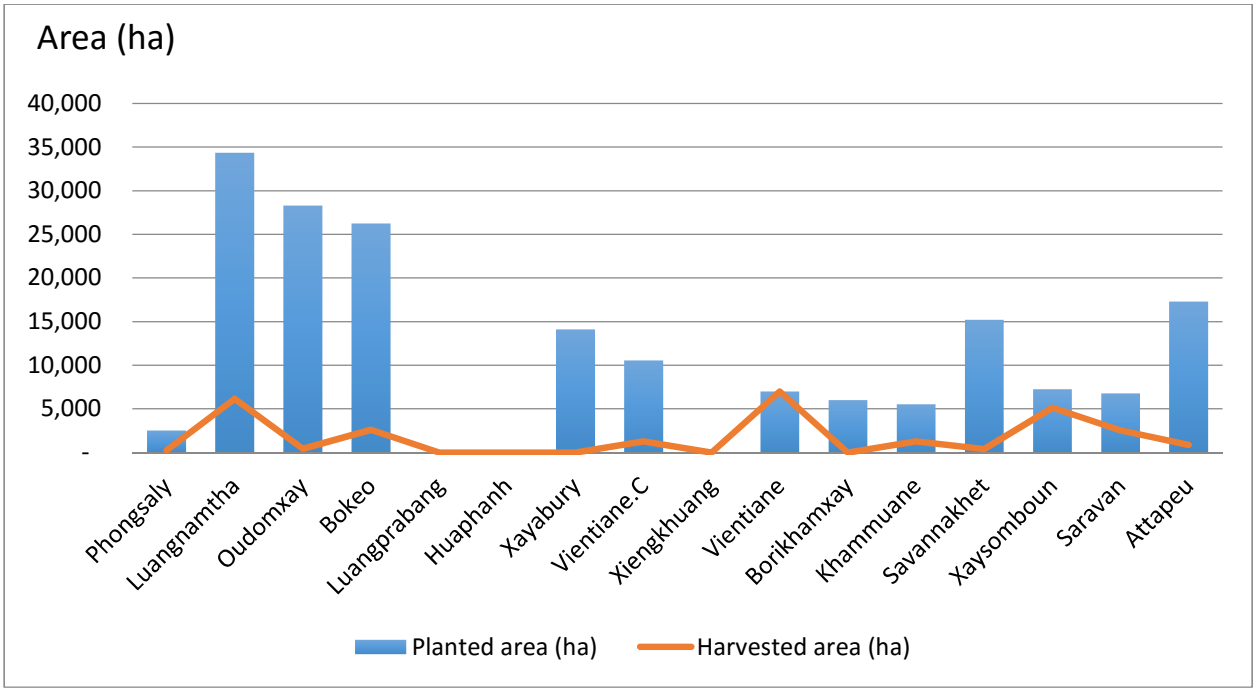
Province	Harvested Area (ha) by types in 2013			Harvested Area (ha)
	Individual	Contract	Concession	
Huaphanh	-	-	-	-
Xaysomboun	-	-	-	-
Central	5,178.18	6.60	880.00	7,469.02
Vientiane C.	NA	NA	NA	140.32
Xiengkhouang	-	-	-	-
Vientiane	2,259.00	-	331.00	2,590.00
Bolikhamxay	2,919.18	6.60	549.00	3,474.78
Khammouan	NA	-	NA	1,263.92
Savannakhet	-	-	-	-
South	2,307.00	642.00	17,305.00	20,254.00
Salavanh	-	-	2,177.00	2,177.00
Champasak	2,307.00	642.00	13,275.00	16,224.00
Sekong	-	-	1,000.00	1,000.00
Attapue	-	-	853.00	853.00
Total	9,691.25	1,623.60	18,385.00	35,959.09

Soure: PAFOs (2013)

The figure 9 shows the planted and harvested area of rubber in country, the large planted areas presented in Louangnamtha with about 35,000 ha and followed by Champasack province with 28,000 ha (DOF, 2015). Recently, the rubber plantation is expanding slowly in Laos compare to previous years due to GoL ban the land concession for rubber plantation and once is the price of latex is declined in recently years. According to the Vientiane Times (January 8, 2009), the failing trend regarding rubber a plantation has eventually reached by foreign investors and the global economic downturn. The vice president of a Chinese association for businesses in Laos states that several Chinese business people want to stop planting rubber in Laos and rather want to diversify by planting other varieties of crops such as mangoes, durian, jujube and other fruits. Moreover, he states that many Chinese investors express interest in growing rice for export to China as an alternative to rubber. “Of course, if a large volume of rice is produced we will set up modern mills to ensure the quality of rice for consumers,” he assures (Svenja H., 2009).LAD13

However, many researchers have predicted that the rubber production will grow up to some of 300,000 hectares by 2020 (Charlotte, H & Saykham, V., et al, 2009). According to this prediction, China will annually require 11.5 million tons while only annually producing 4 million (Miles Kenney, 2009).The prediction is may become true and do not exceed due to the ban of rubber plantation has been functioned since 2012 and it was re-announced again in 2015 by national parliament. However, if rubber plantations exceed 300,000 hectares, Lao rubber sector will face a labor shortage and the impact of labor will effect to the other crop production (NAFRI, 2011).

Figure 9: Area of Rubber Plantation in Laos by Province (2015)

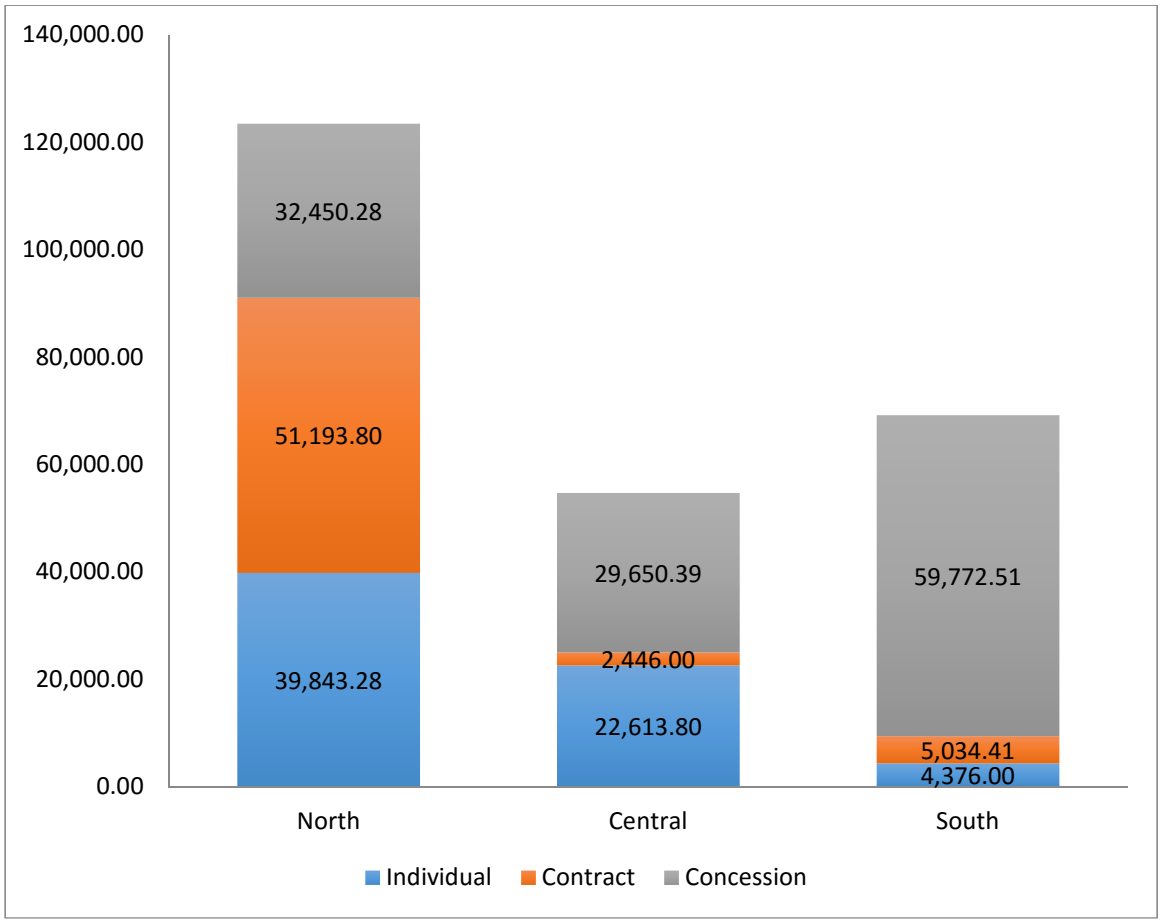


Source: Department of Forestry, 2015

2.2.3 Rubber Production Models

The models for cultivating rubber in Laos are called as based on investment models, although these are not always strictly implemented and can occur in a variety of combination (Charlotte H. et al, 2009). These are three common management arrangements and investment models are currently being adopted in Laos, namely the individual farmermodel with 27%, the contract farming model 24% and the concession model presents 49% of total rubber plantation in Laos (NAFRI, 2013). The individual farmers and contract farming models are mainly found in the north provinces as presented by 32.2 % (about 40,000 ha) and 41.4% (51,000 ha) respectively. The land concession model49.5% or about 60,000 ha is planted in the southern provinces. See figure 10:

Figure 10: Area (hectare) of Rubber Plantation in Different Model by Regions (2013)



Source: NAFRI (2011) and DOPC (2014)

1) Individual farmers/smallholders

This smallholder production model is prevalent in northern Lao PDR, and accounts for approximately 49% of the total rubber production area in the north (NAFRI, 2013) and mainly found in Louangnamtha province with 25% and followed by Bokeo16% and Vientiane province with 15% (see figure 11). The group of farmer receives information and technology transfer through informal channels, such as friends or relatives, particularly from contacts living across the border in China. It solves the shortage labor families (farmer associations). According to the Lao Agriculture Census (2010/2011), the number of rubber growers was 49,000 households and mainly presented in the north with 43,300 households and 5,200 households for the central part and about 600 households for the south.

Farmer associations

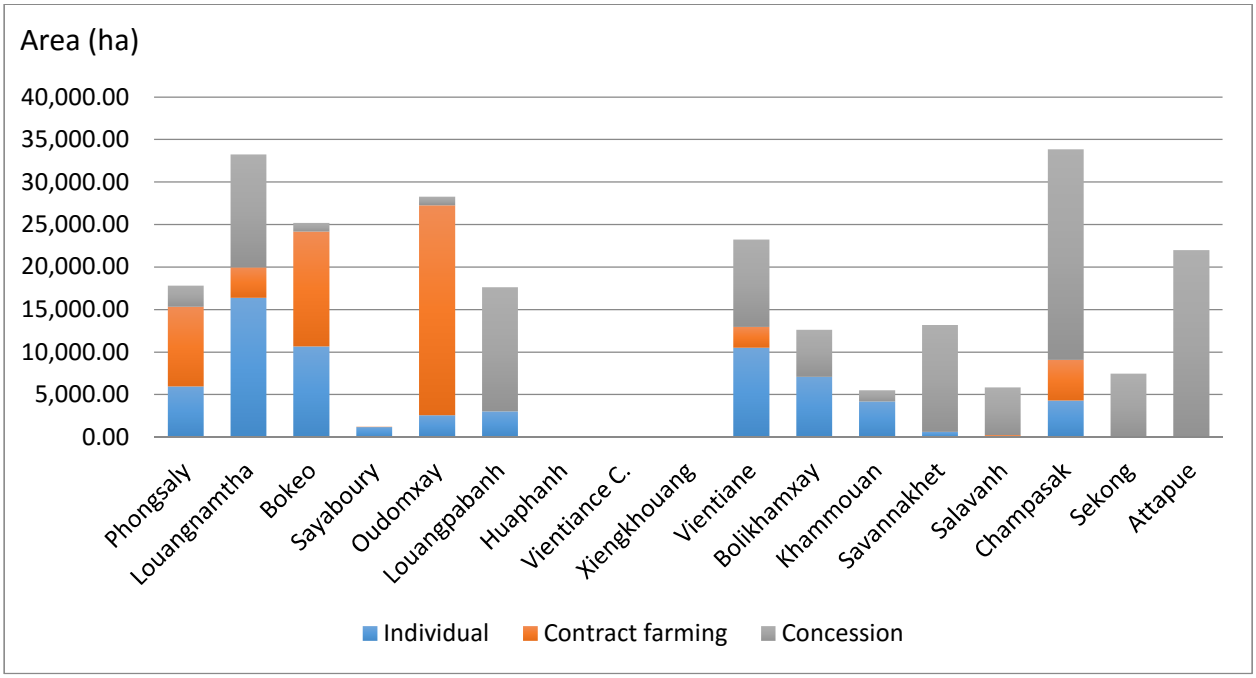
This model is a part of individual farmers model but not very common in Laos, and can be only found in some villages in LuangNamtha, such as in Ban Hadnyao (Charlotte H. et al, 2009). The farmers are organized in groups and land is allocated to individual farmers who are members of the group and labor is shared. Each farmer has to sign an agreement with the association. If some farmers disregard the

agreement, their area of planted rubber trees will be handed over to other farmers for continuous care and maintenance. The most important feature is collective price fixing, where the association decides who its farmers sell to and at what price (Douangsavanh et al, 2008).

Advantage: Famers have high ownership in all activities and get all benefits, no conflict on land and benefit sharing issues; if farmers practice with appropriate techniques they will get all high income and farmers can make decision on selling latex whenever they want such as when the price increase.

Disadvantage: still have limited capacity to manage the organizations, production, marketing as well as bargaining power, and this model cannot be applied for poor household due to limited of investment cost, experiences and market information. Intensive labor use during the tapping latex and it is hard for some families who have limited labor members. In addition, if rubber production is failed (low productivity and low price) are only farmers will get impact due to low capacity of and technical knowledge.

Figure 11: Individual, Contract Farming and Land Concession Model's Rubber Plantation Area (ha) by Provinces



Source: NARI and PAFOs, 2013

2) Contract farming models

According to the reviewed from number of documents, the contract farming model is divided into three types of rubber growing contract, namely "2+3" contract farming; "1+4" contract farming and Individual investor contract. The detail of each contract is indicated as below:

"2+3" contract farming:

In this case investment companies make agreements/ contracts with individual farmers who are required to plant rubber trees under the supervision of (Chinese) specialist. The contract farming provides a way for investors to access land and labour without issuing concessions.

The “2+3” model is the most heavily promoted rubber farming approach in Lao PDR, where the investor supplies capital, technology and a secure market, while the farmer provides land and labour. In this model, the investment companies reach an agreement/contract directly with individual farmers or with farmer associations, who are required to plant rubber under the supervision of specialists provided by the companies. When the trees begin to produce latex, yields are in theory shared at a ratio generally of 70% for the farmer and 30% for the company (In practice, in current agreements most farmers receive less than 70% of the profits). This model is prevalent in northern Laos, especially in Oudomxay, Bokeo and Phongsaly province with cover of 42%, 23% and 16% respectively. For the south mostly has found in Champasak province with only 8% of total rubber plantation of this model (see figure 11 above).

“1+4” contract farming:

The “1+4” contract is more exploitative than the “2+3” in a few ways. Firstly, farmers entering into the “1+4” are of the poorest class of farmers and thus can be manipulated in a number of ways. Secondly, the split of land is problematic for farmers in the long term. Although the land is technically only rented by the company, it must be kept in mind that this period of rent can be between 42 to 50 years, when considering both the length of growing and tapping periods. This type of growing contract is so unfavorable for households, but why do some households enter into such a contract? While a need for a wage labor to survive during the growing years, another key factor is a lack of labor. As several authors indicated that farmers entered into this model they did not have a choice of which contract type to enter, nor did they have the option of not growing at all. The sharing benefit of this model is an opposite with the “2+3” model as is 30% for the farmer and 70% for the company.

Individual investor contract

This model of rubber growing is much less common than other typology of rubber planting. The individuals attempt to make a significant profit from investing in rubber without creating a formal rubber contract/company. Hence some researchers called “informal contract model”. The investments between villages are often between relatives, households of the same ethnicity, or good friends. The most common sharing percentage is 50% for each actor, yet contracts can give up to 70% to the investor and 30% to the original land-owning household.

Advantage: Under this approach the company provides seedlings to the farmers to plant; they will be paid for the work they undertake; and this model is an appropriate for household who have no or small investment cost (company invested 100%). The contract farming bring job opportunity to villagers, provides greater ownership and security for farmers on market and income, hence its promotion by the GoL.

Disadvantage: The studies in LuangNamtha and other provinces have shown that the “2+3” model is not always successful or stable, and is often converted into a “1+4” approach. This approach gives companies more control over production as well as a higher share of the profits. Farmers have no or low bargaining power with companies, the some companies (Chinese) disregarded the role of benefit sharing as appeared in the contracts. The intervention of local government is limited on benefit sharing.

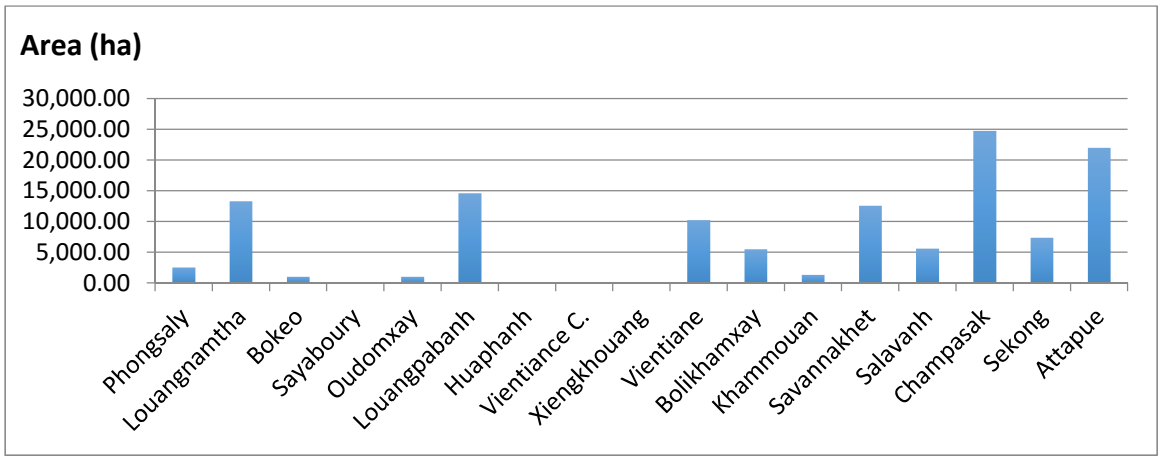
3) Land concession model (rubber companies)

The land for concession is granted by the government within the agricultural policy of the GoL there are effectively three hierarchies of decision making for granting concessions to private companies and according to the Land Law:

- For areas of 3–100 ha the provincial authority is the approving body
- For 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 areas over 10,000 ha the government is responsible for the granting of concessions, after approval by the parliament

In this production model, the investment company has a relatively high level of autonomy in managing the cultivation and production of rubber. The company is allocated land, and hires labour to help establish, operate and harvest from the plantation. It is fully responsible for capital, techniques, planting material, sourcing labor and marketing its products. This model is prevalent in the Southern provinces that invested by Vietnamese companies, namely Champasak, Attapue and Savannakhet province with 20%, 18% and 10% respectively. However, it is also found in the North provinces, which invested by Chinese companies, namely Louangpabang 12% and Louangnamtha 11% and other provinces such as Phongsaly, Bokeo and Oudomxay province (see figure 11 above).

Figure 12: **Land Concession Model's Rubber Plantation Area by Province (2013)**

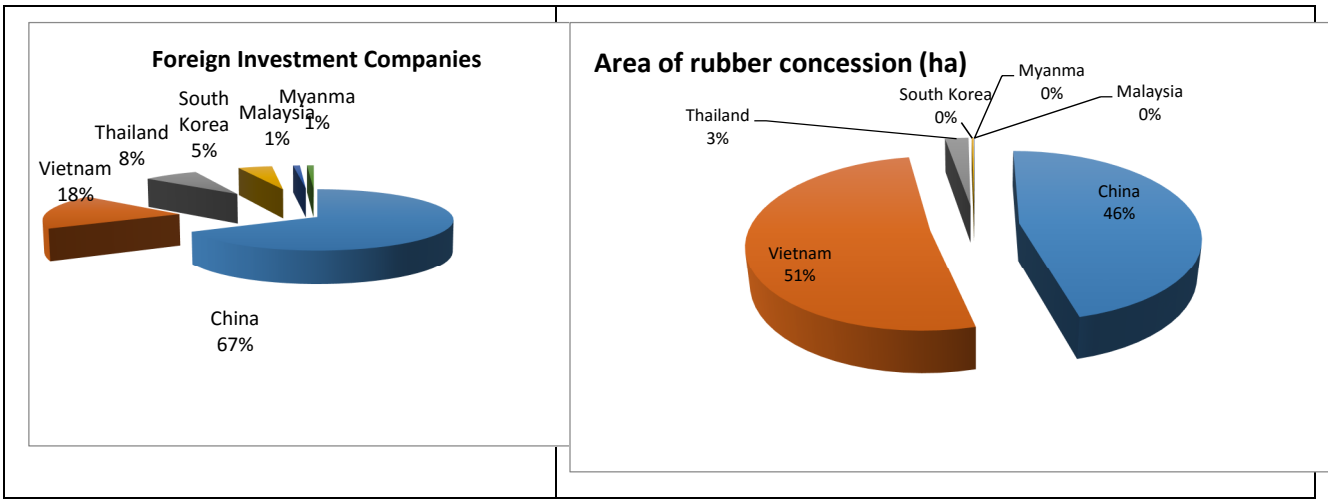


Source: NARI, 2013

Share of international company in rubber land concession in Laos

According to data of the Agricultural Investment Division of DOPC (2014) shows that there are total of 104 companies are investing in rubber plantation in Laos with the area of 184,055 ha. The 70 Companies are owned by Chinese companies with area of 84,626 ha (46%) and mainly in North provinces, 19 companies is Vietnamese with the area of 94,360ha (51%) and mainly in the south provinces of Laos (see figure 14)

Figure 13. Number of International Company in Rubber Land Concession (2014)



Source: DAI, DOPC 2014.

The price of concession

As recently, the average fee of land concession for rubber plantation in Laos is about 6 USD/ha/year or about 48,000 Kip/ha/year. In some provinces, however the fee of land concession was conducted from the tapping latex year and some provinces the fee is very low as found in Oudomxay and Vientiane provinces. For the LouangNamtha province the fee of land concession is different from other places by counting from number of rubber tree as 0.9USD/tree/year or equivalent to 3,2 million Kip/ha/ha, in this case the fee will be taken when the rubber tree provide latex or the year of tapping latex (NAFRI, 2011). Thus, the fee in case of LouangNamtha province is higher than other places. According to the number of studies on land concession fee revealed that the fee is too low compare to neighbor countries and does not worth the economic return.

Therefore, in 2009s the Lao government used the presidential edict on hiring and land concession fee no. 02/president, dated 18 November 2009 to conduct the fee of 30 USD/ha/year for the area of limited infrastructure construction and 40 USD/ha/year for the available area of infrastructure contraction in some area and 50 USD/ha/year for the full infrastructure construction area. However, the presidential edict has not appropriate applied in the country due to the number of contracts have been functioned before the presidential edict issued, and only some new land concession provinces used the presidential edict such as Attapue and Xiengkhouang province.

The table 3 shows the summary of the five growing types of rubber growing in Laos. According to Miles Kenney (2009), indicated that the division of these contracts is based upon two factors: the difference of agricultural input provision and the ways in which the land, latex, or returns from latex are shared. The literature on northern Lao rubber growing (Alton et al. 2005; Shi 2008) identifies five agricultural inputs 4 that are necessary for the successful growing and sale of rubber. These are land, labor, capital, technical knowledge (also referred here to as technique), and market access. The typology of the rubber growing used in the analysis is based upon which party provides each of the five inputs.

Advantage: villagers around the concession area are paid as wage laborers (20,000 Kip/day/person until

2014 and in 2015 the wage rate increased to 30,000 Kip/day/person), the high productivity (harvesting and pricing).

Disadvantage: According to number of reviewed documents have found that the wage labor could not compare to the losses and dispute between company and villagers always occur in the villages, namely uncompensated losses of non-asset resource entitlements by villagers (e.g. non-timber forest products (NTFPs) and of public goods (e.g. watershed protection services) by the state; configurations of resource use that secure resource control but decrease net benefits, and that in doing so fail to capitalize effectively on Laos overall comparative advantages (Dwyer, 2007) and the wages provided by the company were considered to be poor and were lower than what was originally promised and written in the official contracts (Karen E.,2015). See table 4.

Table 3: Summary of Characteristic of Rubber Production Model

Rubber production model	Agricultural Inputs	Sharing	Analysis
Individual farmer	Farmer provides all inputs, no other parties are involved	Farmer takes all profits	Requires the most capital, most profitable, yet but has the great production risks
2+3 Company Contracts	Farmer provides land and labor; company provides capital, technique, and market	Return from latex split when tapping; most common splitting is 65% for farmers, 35% for the company	Farmers must have extra land for other crops and enough income or food security to support themselves for 7-10 years; Greater profits than "1+4" model, but higher production risk as well.
"1+4" Company Contracts	Farmer only provide land; company provides labor, capital, techniques and market	Land is most commonly share; the share occurs 1 to 4 years after seedling are planted; Most common sharing is 30% for the farmer and 70% for the company.	For farmers unable subsist for 7-10 years; wage labor reduce risk but also leads to lower profits
Individual Investor Contract	Farmer provides land, investor provides capital and technique; both provide labor and each party is responsible for marketing	Land is most commonly share; the share occurs sometime between planting and tapping; most common sharing is 50/50.	Most variable and informal contract; contract are often oral; written contract aren't signed by the Government and therefore not subject to government regulation; framers are vulnerable to land appropriation by investors
Company concession	Company provides all inputs; land is owned or rented by the company; villagers sometimes work on the company as a wage.	Company retains all profits.	Company land is given away by the government and often previously belong to villagers; besides possible wage labor, farmers receive no benefit

Source: Author, 2015

Table 4: Summary of Advantage and Disadvantage of Rubber Production Model

Rubber production model	Advantage	Disadvantage
Individual farmer	– Income generation from benefit sharing of rubber products – Famers have high ownership in all activities and get all benefits, – No conflict on land and benefit sharing issues; – If farmers practice with appropriate techniques they will get all high income – Farmers will able to sell latex whenever they want such as when the price increase.	– Not appropriate for poor household due to limited financial resources, techniques, experiences and market information – Tapping latex period is highly labor used and it bring negative impact to children labors in the family (absent school) – If rubber production is not successful only farmers will get impact. – No bargaining power (if not member of labor production group in the commune).
Contract farming		
2+3 model	– Return from latex split when tapping; most common splitting is 65% for farmers, 35% for the company. – High income generation from benefit sharing of rubber products – Help poor farmers who have no or limited investment cost to grow rubber. – Benefit from the empty land or bare land area. – Company invests all process of plantation (100%). – Villagers have learned and get benefited from companies. – Market available	– Villagers have no opportunity to grow other crops in long term. – Villagers have low capacity to deal with company due to limited of knowledge on law, right and understanding of contract. – The companies more control over production but farmers still can work on their land – The some companies fraud and buy very low price due to farmers do not know about price. – Farmers have limited bargaining power with companies, the some companies (Chinese) disregarded the role of benefit sharing as appeared in the contracts. – The intervention of local government is limited
1+4 model	– Land is most commonly share; the share occurs 1 to 4 years after seedling are planted; most common sharing is 30% for the farmer and 70% for the company. – If work on their land, farmer will be paid in cash	– Small profit sharing compare to 2+3 model – The companies more control over land and no right on land management due during length of concession (rubber tree 35-40 years)

Rubber production model	Advantage	Disadvantage
	– Benefit from empty land or bare land area. – Farmers have more time for other activities of household – Market available –	– Low income generation from benefit sharing of rubber products – Demarcate farmers out from their land – Not related to rubber production and market – Farmers have limited bargaining power with companies, the some companies (Chinese) disregarded the role of benefit sharing as appeared in the contracts.
Company Concession	– Income gernation from labor wage in the plantation. – Rapidly extension of rubber production in Laos – The areas of plantation do not scattered and in one piece, easy to manage, control and harvest. – Bring wage to villagers who live around the plantations – High effective, productive and marketing – GoL gets fee from concession	– The companies always take over the large area for concession and it cover of both the state and village land, especially agricultural land, common land, production forest area and even conservation area. – Land conflict as common seen – Land right is belong to foreigners as long terms. – Labor conflict due to low skill and limited Lao local labor and companies used foreigner labors. – top-down approach, coercion, disputes over terms and wages, overlapping and unclear land designation, labor shortage, lack of alternate income source for remote villagers. – In some rubber concession area covered the agricultural production area of villagers, common land for NTFP, forest areas and national conversation forest. – Villagers lose access to common land – Uncompensated losses of assets, both villagers' private assets and state/public assets

Source: NAFRI, 2011and Author, 2015

2.2.4 Rubber Market

The main market of rubber in Laos is influenced by demand from neighbor countries are China, Thailand and Vietnam. The markets to discuss in the following are for the individual farmers model in the north to the southern provinces are differenced by characteristic. According to Shi (2008), accounts for around 80% of the total rubber plantation areas of stallholders in Laos lacks a clear market perspective, strategy or access to related information. They believe that rubber planting companies and traders will buy their latex for export to neighboring countries (i.e. China and Vietnam). Lao PDR's rubber sector is closely linked to rubber production centers in neighboring countries, particularly in China and Vietnam. As discussed above, demand for natural rubber is expected to increase, with a projected demand-supply gap of between 1 and 1.3 million tons per year from 2010 to 2020. China, Japan, Europe and the United States are the main sources of this demand, and together consumed over 64% of global natural rubber supplies in 2006 (IRSG, 2007).

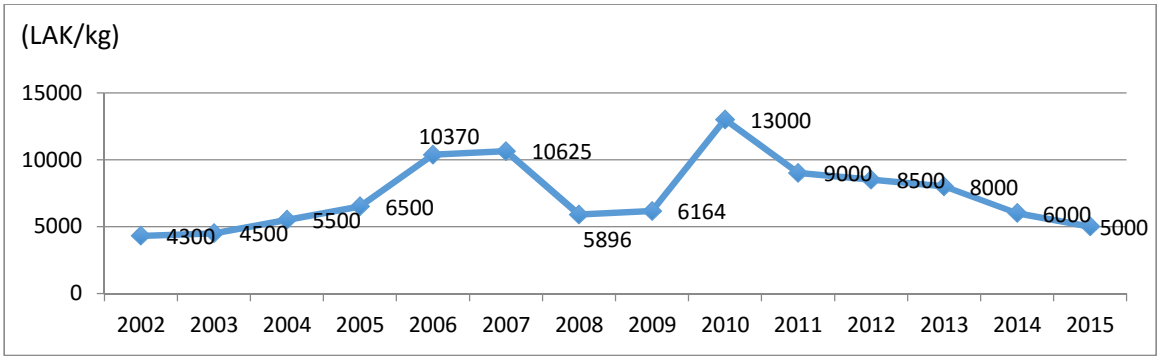
As discussed above, China is the world number one rubber consumer. According to IRSG (2007), China's demand for natural rubber is expected to increase constantly and rapidly during coming decade, and is predicted to reach 4.8 million tons by 2020. China has a limited capacity to increase its domestic rubber production due to a number of reasons, land scarcity in particular. IRSG predicts that China could increase its production capacity to 0.8 million tons annually at the most by 2020, meaning that it would need to import around 4 million tons of natural rubber. Figure 6 shows previous and predicted production, demand and import levels for natural rubber in China until 2020.

2.2.5 Rubber Price in Laos

The rubber price in Laos is associated follow the global price. However, rubber produced by smallholder farmers is often fluctuating in quality. Some of them do not process their rubber, for example in Luangnamtha Province. Low quality and unprocessed rubber is often paid at much lower price which up to almost 33% (Douangsavanh et al, 2009). This leads to low income of the households. Some of the problems in marketing also include limited access markets and market information, as well as bargaining power.

The rubber price in three parts is different that depending on the product types and stakeholder in the supply chain characteristics. For example, the sheet rubber price in the central provinces was higher than other part of Laos (20,000 to 23,750 Kip/kg) that because farmers sell rubber directly to Thai traders as well as processed by dried sheet rubber. While the farm gate price in the north was only between 5,200 to 9,100 Kip/kg that because their sold in tub lump rubber and also many stage of buyers/traders in the supply chain. In 2002 the tub lump rubber price in the north was 4,300 KIP/Kg and continue increased to about 10,000 KIP/kg in 2007. However, the price of rubber in the country has fluctuated and followed the global price. For instant, the rubber price has fallen in 2008-2009 as followed by global rubber price, which has resulted by global economic crisis. The natural rubber price increased again in 2010 reaching to the peak of 13,000 KIP/kg in Laos and 4,340 USD/ton in international price that results of the demand for rubber from neighbor countries (both natural and synthetic) is a close correlate of overall global economic growth. The price of tub-lump rubber was declined again since 2011. In 2013 the farm gate price of tub lump rubber was about 7,000-8,000 KIP/kg in the north, 7,500-9,000KIP/kg for the central part and 8,000-9,000 KIP/kg in the southern provinces, then the price continued downturn to 5,000 KIP/kg in first quarterly of 2015 see figure 15 (NAFRI, 2011). According to the latest information from PAFO of Bokeo province reported that the price of tub-lump rubber in March 2016 was down to 4,000 KIP/Kg.

Figure 14: Average Tub-Lump Rubber Price in Laos by Year



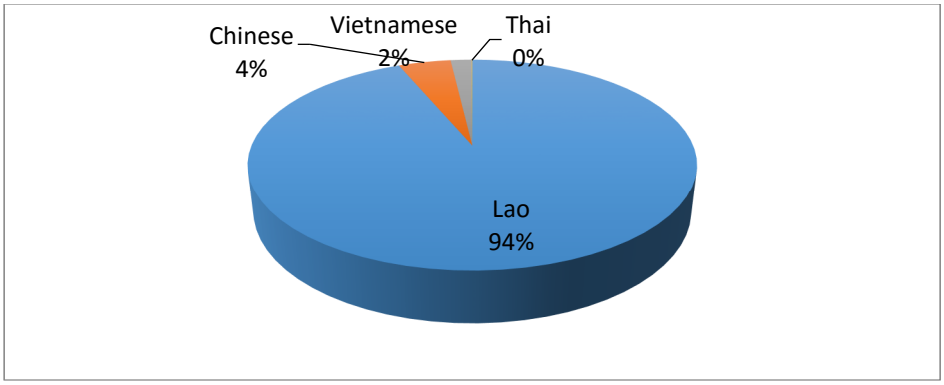
Source: NAFRI (2011), PAFOs (2015)

2.2.6 Labor use in rubber production

NAFRI (2011) shows that the total labor used in the rubber production were about 37,500 persons. In the north provinces used largest number of labors in rubber production compare to other parts of Laos with 16,410 persons or covered by 43.7% of total labor used for rubber in Laos, followed by southern provinces with 12,990 persons or 34.6% and central part 8,100 persons or 21.6%. The share of Laos is highest with 35,780 persons or 94%, with followed by foreigner labors[5], which 4.6% of Vietnamese labor and mainly found in the south, and Chinese labor about 2.7% found in the north provinces, see figure 16.

The capacity of labor for tapping latex is depending on labor experiences. The number of previous researches also shows that for who is a beginner tapping in first during 3-5 months would take 150-200 trees/day/person, and after that continue increase to 300-400 trees/day/person. However, the number of tree for tapping latex in the central and south is higher north with 400-450 trees/day/person or about 1 ha per day[6]. If comparison the capacity of a labor for tapping latex in the northern tapped about 0.7-0.9 ha/day/person; central and south part labor was about 0.8-1 ha/day/person. It means that average of 0.8 ha/day /person of tapping latex for Lao labor.

Figure 15 Share of Labor Use in Rubber Production by Nationality (2011)



Source: NAFRI, 2011

[5] Registered labors

[6] 450 rubber trees per ha

Table 5: Calendar of Labor input on Tapping Latex Compare to Other Crops Practice Activities

Category	Month											
	01	02	03	04	05	06	07	08	09	10	11	12
Rubber												
Northern				Harvesting								
Central +South (After first 3 year)	Harvesting			Harvesting							Harvesting	
Central +South (After 3 year)	Harvesting			Harvesting								
Crops												
Upland rice			(Clear cutting, burn)		Seeding					Harvesting		
Paddy rice				Harvesting (Dry)		Transplanting (wet)					Harvesting (wet)	Transplanting (dry)
Maize				Planting						Harvesting		
Soybean			Harvesting (dry season)							Planting (dry)		
Cassava				Land Preparation					Harvesting			
Tea			Harvesting									
Coffee					Planting					Harvesting		
Sugarcane	Harvesting											Soil preparation

Source: NAFRI, 2011 and Author, 2015

The labor shortage is the main constraint among both smallholders and company-led investments, has been widely observed in LuangNamtha (Shi, 2008). It is a shared concern among farmers as well as investors. According to the Investment Promotion Law, the use of foreign laborers, if necessary, must not exceed 10% of the enterprise's labor force and businesses must give priority to employing Lao workers. Investors have found this a difficult limitation to manage. Not being able to bring in an adequate number of technical workers and supervisors has interfered with the progress and quality of plantation development;

the high costs of obtaining temporary residential permits for imported workers also place extra burdens on the businesses. Chinese investors list labor shortage as one of their primary concerns, if not the top concern, about operating in the rubber sector of Lao PDR.

2.2.7 Input service providers

There are two main groups of international investors in the Lao rubber sector: Chinese and Vietnamese investors. The majority of these companies are private companies with support from their government. For example, Chinese Government supports the company through opium replacement subsidies and brings back the rubber to meet rubber demand in China. The companies support input service production, the major materials used are planting materials, fertilizers, and weedicide. In the mature period, the materials used are tapping materials (mangles, cups, spouts, tapping knife, pails, pan, headlamp, and formic acid) and processing materials including the establishment of a smoke house and its maintenance (DoA, 1985).

2.3. Risk in rubber production

2.3.1 Socio-economics

For villagers who provided land to the company as the form of "1+4" model and concession have changed to becoming heavily depending on rubber company labor (Ian G., 2010). Villagers who involve in the rubber plantation have no time to find NTFP or food from forest. It mean that their daily life more and more depending on rubber production or rubber companies as other studies observed that in the past they bought very little food due to harvested NTFP from forest. While, they have to use almost of their daily income to buy foods and some of them have become idle due to a lack of farming and foraging opportunities.

For villagers who work in rubber plantation companies seems that the companies makes their life to transform through introducing new forms of discipline to their labor force and change their livelihoods.

2.3.2 Risk on Market Exclusive: Business

In 2011, NAFRI has conducted rubber production in Laos and the results indicate that up to now Laos has no specific organization in responsibility of rubber sector governance, price and marketing system. On the other hand, rubber farmers have limited access to real time market information (rubber price is highly fluctuated by daily); the rubber product of individual farmers is in the form of tub lump (raw rubber) with low price compare to other processing products and the tub lump cannot storage in long time.

2.3.3 Climate Changes/Natural Disaster:

Researchers have predicted that climate change will have serious consequences for agriculture, particularly for smallholders in poor developing countries. In tropical countries even moderate warming (1 degree C for wheat and maize, 2 degrees C for rice) can reduce yields significantly because many crops are already at the limit of their heat tolerance (World Bank, 2007). However, there are no evident of the climate change impact on rubber production.

2.3.4 Common Risk and Vulnerability of Smallholder Rubber Production

Summary of Lessons Learned from the work of Douangsavanh et al., Bansa, Thammavong and Andrew Noble (2008) on Working Paper: Meeting Regional and Global Demands for Rubber: A Key to Poverty

Alleviation in Lao PDR. The literatures concluded some key constraints related to rubber planting in Lao PDR:

1) Lack of knowledge of rubber variety selection.
2) Lack of access to information sources and information exchange on rubber.
3) Lack of knowledge of suitable rubber variety for specific areas.
4) Lack of funds to expand rubber plantation.
5) Conflict between permanent resident and migrant insufficient water and electricity for rubber processing within villages.
6) Lack of knowledge about latex storage and processing practices.
7) Large concession areas affected by land use planning and land allocation.
8) Research on rubber is still weak, because rubber is a new issue for Lao PDR and the country lacks rubber expertise.
9) In addition to risks in humid tropics rubber farming >900 m and at slopes >248 may be non-profitable even at high price levels. Furthermore, risk of long-term degradation of land due to topsoil erosion, soil compaction, disruption of natural stream flows, stream sedimentation and greater risk of landslides. Potential exposure to risk could be very high where rubber is the sole income source (A. Ahrendset al.2015).

Table 6 shows the common risk that often happen with smallholder who involved in practicing rubber plantation by their own family, contract and wage from concession.

Table 6: The Risk of Smallholder in Different Rubber Production Model

Type of risks	Individual	Contract	Concession
Socio-economic	– Food insecurity (highly risk during the 3-7 years before tapping latex) – Financial risk (for who have to pay interest rate, highly during 7 years before tapping)	– Livelihoods depended on income from wage – Unstable income from wage – Buy 90% of what they consume. – Become idle due to a lack of farming and foraging opportunities – Unfair benefit sharing due to low education and misunderstand the contract. – Loss NTFP due to large area in the village.	– Uncertain income for laborers who work in plantation – Land conflict and lose of common land, received poor compensation – Unstable income from wage – Loss of income sources from NTFP, and social conflict – Unfair labor fee between Lao and imported labors
Technique	– Low productivity due to low experience and technique of rubber tapping – Labor shortage – Select appropriate variety, latex storage and processing practices.	– Low skill labor and labor conflict with imported labors	No

Type of risks	Individual	Contract	Concession
Market	– Low price due to limited bargaining power with traders – Market information.	No	No

Source: Douangsavanh et al, 2009 and Author, 2015

2.3.5 Role of Smallholders in Rubber Value Chain and their Existing Risks

In addition to the risk/vulnerability of smallholders from production models (Table 7), this report identifies source of risks. This source is risk/vulnerability of smallholder based on their role in value chain as following:

Producers (Individual farmers)

Most of the households involved in rubber cultivation in Lao PDR have been introduced to rubber and received market and technical information through informal channels. These include relatives, friends or traders who live across the border (in China). Individual farmers are also called smallholder rubber production. This group takes on the role and responsible for all activities associated with the selection of varieties, the production of seedlings, grafting, selecting areas to plant, land preparation, planting and maintenance, tapping latex, drying and sale of the latex to intermediary outlets.

According to the Charlotte et al (2009) found that individual rubber production is very important and significant to the local livelihoods, and it is also a very significant portion of the agricultural and rubber sectors, with account for 27% or about 70,000 ha of total rubber production area in Laos and mainly found in the north provinces. The raw rubber sheet from the individual farmers produced about 18,025 tons in 2013 or equivalent to about 44 million USD[7].

The risk of smallholder in the rubber value chain based on their role as producer (individual invest):

1) Risk of production cost, the rubber smallholder often fact with high production cost of material and labor cost due to these costs are incurred throughout the life of rubber plantation.
2) Food insecurity, highly risk during the 3-4 years before tapping latex.
3) Income risk due to tendency towards single income source carries increased risk during no latex.
4) Financial risk for who have to pay interest rate, highly during 6 years before tapping.
5) Productivity risk due to low experiences and technique of rubber tapping, selecting an appropriate variety, latex storage and processing practices.
6) Market risks for rubber farmers who do not involve in the contract farming “2+3 and 1+4” due to rubber low bargaining power and limited market places and information, as currently rubber farmers only wait for rubber markets (buyers) come to their place to buy rubber latex.
7) No agreements between Lao and Chinese Governments on rubber trade.

Producers (Under contract farming)

This group takes on the role and responsible for providing land and household labors in the plantation with main activities of land preparation, planting, maintenance, tapping latex and simply processing. The company respond for financial, technical support and marketing.

The risk of smallholder in the rubber value chain based on their role as producer under contract farming:

[7]Calculated from table2 (total area of 9,691.25ha x 1.86 ton/ha x 2,460 USD/ton price in 2013).

1) As rubber rapidly expands into forest and livestock grazing areas, there is concern that relatively less well-off families depending on NTFPs for food and household income will have less option to ensure food security. The Loss of food and income sources from NTFP, and some community has risk in social conflict due to land use overlapping.
2) Food insecurity, highly risk during the 6 years before tapping latex due to all family members played high attention to the plantation then limited time to do other farmers such as vegetable and rice growing, animal husbandry and finding food. In some areas the rubber plantation was planted on rice fields and fallow areas. This could lead to increasing food insecurity and the loss of forested areas.
3) Income risk due to tendency towards single income source carries increased risk during no latex.
4) Labour shortage, mainly for families who have limited labour members.
5) Productivity risk due to low experiences and technique of rubber tapping, selecting an appropriate variety, latex storage and processing practices.
6) Become idle due to a lack of farming and foraging opportunities.
7) Unfair benefits sharing due to farmers have low education and misunderstand the contract.

Producer as Laborers (Concession)

Another role of stallholder group is to contribute labor to the rubber concession plantation through the wage of incentives. The Lao workers in the rubber plantation are included both the rubber planters and non-rubber planters with total of 94% of labor used in the plantation or about 35,780 persons are relied on wage from rubber plantation (LAC, 2010/2011 and NAFRI, 2011). NAFRI (2007) and Vongkham (2006) found that the labor for tapping latex is required less 8 month/year or about 150-200 man-days/ha/year compared to preparing land and planting rubber seedlings 400-500 man-days/ha/year. However, in case of Southern provinces some expect that labor demand may increase substantially once tapping begins (Luangaramsi et al. 2008).The capacity of a labor for tapping latex was about 0.8-1 ha/day/person.

The risk of smallholder in the rubber value chain based on their role as laborers:

1) Older and younger labors are often excluded from employers and make difficult to the families who based on wage for daily consumption. Especially, women are not allowed to bring young children to work. This makes employment difficult for women with small children.
2) Risk on education due to many children quit school to labor in the plantation to support their families, especially when their parents are unable to work due to their age or for other reasons.
3) Uncertain income due to heavily depend on a single income source (wage), non-permanent workers, the labor of working days per year was less than a quarter (three months) of the working year and labors are often hired on a piece work basis, thus making it very difficult for people to make a living through working on the rubber plantations. Some laborers have changed from being more or less-sufficient to becoming heavily dependent on rubber company labor.
4) Unstable, unfair, no standard and delay the wage payment in the rubber plantation (paid less then original agreed rates). This may cause to food insecurity due to 90% of income from wage will be spend for food what they consumes
5) There is the risk of losing job due to there are many neighbor country workers com to Laos and mostly Vietnamese workers, working on Lao rubber plantation in Southern provinces. Another reason is plantation owners do usually not tap the latex whenever the price of national latex is down. There are no guarantees that farmers will receive temporary or permanent work in rubber

concession areas. The employers can choose to replace them with outside labors, including Vietnamese workers, thus putting villagers in potentially insecure situations (Ian, G., 2010). As based on several literatures estimated that the rubber production demand for labor may decline in the future due to the high skill labor will replace the number of low existing labors skills. In other reasons many rubber plantations have been clear cut and converted to grow other crops.

6) Rubber workers are frequently exposed to dangerous herbicides or other chemicals applied to the rubber plantations, causing various health problems.

Table 7: Summary Risk/Vulnerability of Smallholder based on Their Role in Value Chain

Producers/individual farmers	Producers/contract farming	Producers/Laborer
1) High production cost 2) Falling into food insecurity 3) Income risk 4) Financial risk 5) Productivity risk 6) Low bargaining power and market risks 7) No agreements between Lao and Chinese Governments on rubber trade	1) Families depending on NTFPs will have fewer options for livelihoods. Community has risk in social conflict due to land use overlapping. 2) Food insecurity, highly risk during the 6 years before tapping latex due to all family members played high attention to the plantation then limited time to do other farmers such as vegetable and rice growing, animal husbandry and finding food. In some areas the rubber plantation was planted on rice fields and fallow areas. This could lead to increasing food insecurity and the loss of forested areas. 3) Income risk 4) Labour shortage, mainly for families who have limited labour members. 5) Productivity risk 6) Become idle due to a lack of farming and foraging opportunities. 7) Unfair benefits sharing between farmers and contractors	1. Employment inequality 2. Discourage children to go to school/Encourage children to quit schooling. 3. Uncertain income due to heavily depend on a single income source (wage), some laborers have changed from being more or less sufficient to becoming heavily dependent on rubber company labor. 4. Unstable, unfair, no standard and delay the wage payment in the rubber plantation (paid less then original agreed rates). This may cause to food insecurity due to 90% of income from wage will be spend for food what they consumes 5. There are no guarantees that farmers will receive temporary or permanent work. Risk of losing job due to rubber production demand for labor may decline in the future due to the quality labor will increase and number of low skill labors will decrease. In other reasons many rubber plantations have been clear cut and converted to grow other crops and pastureland. 6. Have health problems

2.3.6 Risk Coping Capacity of Smallholder farmers

Diversification of livelihood sources

Smallholders often face a number of individual risks such as disease, injury and death of animals, as well as common or aggregate risks such as drought, epidemic and economy-wide hocks, affecting everyone in the locality. The consequences of these risks can be extremely severe, potentially leading to malnutrition, disease, starvation or even death. As a result, managing and coping with risks are an integral part of the daily lives of poor rural people. However, the risk coping by stallholder rubber is still low behind their need and mainly need for improving market risk, productivity risk, and financial risk. Therefore, the coping risk is need from multi-stakeholders involve in the action (more detail of risk coping indicate in section 4.2).

Government and others support

As currently, the government supports smallholder rubber farmer more than concession in term of market and technique through the development projects such training, providing basic equipment and so on. The government stopped the land concession for rubber and mining since 2012. For the existing concession area is needed to review and evaluate the impact on socio-economic of local people and review the fee of concession. The total rubber plantation area should not more than 350,000 ha in the future in order to reduce the risk and to secure the price and quality (NAFRI, 2011). In addition, another support is the facilitation of selection seed and low credit policy.

2.4. Rubber Smallholders Production in Laos

2.4.1 Defining Smallholders in Lao Rubber Sector

Smallholder farmers, also known as family farms, have been defined in a variety of ways. The most common measure is farm size: many sources define small farms as those with less than 2 hectares of agricultural land (Thapa, 2009; World Bank, 2003). Others describe small farms as those depending on household members for most of the labor or those with a subsistence orientation, where the primary aim of the farm is to produce the bulk of the household's consumption of staple foods (Hazell et al., 2007). Yet others define small farms as those with limited resources including land, capital, skills and labor.

An FAO defines smallholders as farmers with limited resource endowments, relative to other farmers in the sector (Dixon et al 2003). Another defined by FAO the smallholder farmers as they often cultivate less than 1 ha of land, whereas they may cultivate 10 ha or more in semi-arid (dry) areas, or manages 10 head of livestock. Often, no sharp distinction between smallholders and other larger farms is necessary. The definition of smallholders differs between countries and between agro-ecological zones.

Conversely, with regards to Robert McC. Netting (1993) defined that "smallholders are rural cultivators practicing intensive, permanent, diversified agriculture on relative small farm in area of dense population. Family household is the major corporate social unit for mobilized agriculture labour, managing productive resources, and organizing consumption. The household production is mainly for subsistence and generally participating in market where they can sell goods and cottage industry and as well find off-farm labour". Smallholder farmers, also known as family farms, have been defined in a variety of ways. The most common measure is farm size: many sources define small farms as those with less than 2 hectares of crop land (Ganesh Thapa and RaghavGaiha., 2011).

However, in Laos the farm size is small. As based on the study conducted by NAFRI in Oudomxay and LuangPrabang, household found that the average farm size is about 1.6 ha. This average plantation area is relatively large compared with those in Xishuangbanna, in China's Yunnan Province, where household plant about 0.1-0.5 ha of rubber (Fujita, 2007). However, the Lao average is relatively small in comparison with other Asian countries such as Thailand and Malaysia, where smallholder rubber producers own on average 2 to 5 ha per household (Fujita, 2007).

According the Simone, V. et al (2007) found that stallholder families who plant rubber in general have more access to agricultural land (paddy field) than those who do not plant. Their study also highlighted that the main reasons for farmers to start planting rubber is their high expectation on income and their interest in commercial agriculture production. However, the majority of farmers cannot access information of agricultural markets and have not organized themselves into production groups to better take advantage of emerging market opportunities.

According to the Laos Extension for Agriculture Project (LEAP) defines that the smallholder farm as a farmer actively engaged in managing and working on his or her own land, whether or not titled or officially recognized, of limited size, usually less than 2 hectares (LEAP[8], 2011). Another source to the definition of smallholder from the Smallholder Development Project of Ministry of Agriculture and Forestry, funded by ADB (2010-2015) in Laos, has defined the 'smallholder farmers as a farmer actively involved in agricultural production and limited of market to sell their products'.

Therefore, this report considers the individual rubber famer model is the key smallholder farmer due to their involved in the rubber plantation for their livelihood and they are who usually limited market access and low bargaining power of market price. However, the report is also considers the rubber farmers who involve in contract farming model as smallholder farmers because they usually involved in wage from rubber plantation and there have limited capital, skills and labors.

2.4.2 Processing Techniques

According to the research of NAFRI (2011, 2013) revealed that the smallholder rubber has limited processing facilities and their exported the raw latex without processing or only basic processing activities. As currently, there are only few companies try to install the small processing factories for process sheet rubber and lump rubber. While smallholder households who have capacity to investment has installed the sheet rubber processing at the household level. The final product of rubber processing in Laos is mainly for tub-lump rubber (raw latex) and it covered by 85% of total rubber processing in Laos, followed by 15% for sheet rubber (see figure 17).

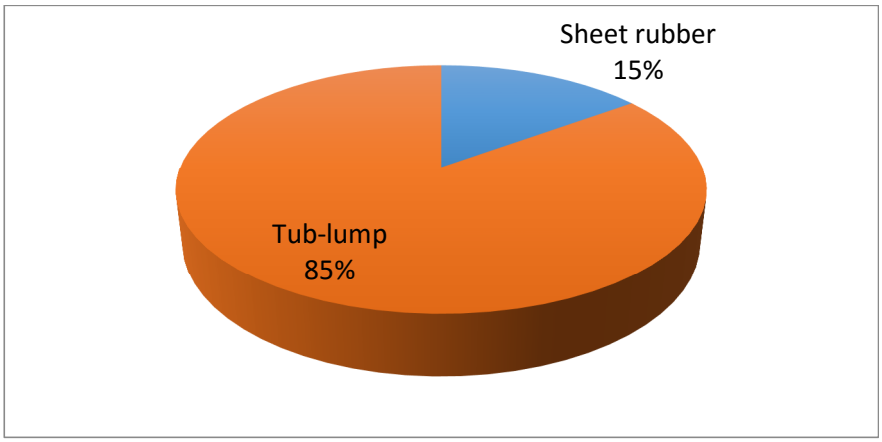
In the Northern provinces, the tub-lump rubber covers of 60% of total processing rubber in the north. In recently Chinese investors processed 35% of lump rubber (block) and sheet rubber 5% in the northern Laos. The processing in the central part 90% is for tub lump and 10% for sheet rubber. In the south, 50% of processing is lump rubber, 30% for sheet rubber and 20% for tub-lump because there is a big factory of Vietnamese investor in the Bachieng district, Champasack province.

The price of tub-lump rubber is high and eases to process compare to sheet rubber. According to the NAFRI researches (2011) found that the 3Kg of tub-lump can only convert to 1.1 kg of sheet rubber. In case of

[8]The Laos Extension for Agriculture Project (LEAP)

Bolikhamxay province the price of 3kg of tub-lump was 54,600KIP and the price of 1.1 sheet rubber was only 47,200KIP. It means that the market value of tub-lump provides greater than sheet rubber about 15.9%. However, there are some rubber farmers chooses to processes the sheet rubber due to it can store in long term to wait until appropriate price before selling.

Figure 16: Type of Rubber Processing in Laos before Export



Source: NAFRI, 2013

The average yield in the first year of tapping was 904 kg/ha, but it increased to 1,380 kg/ha in the second year, and then to 1,999 kg/ha in the third year. This yield pattern is consistent with the normal yield profile of a rubber plantation (Manivong, V. 2009). The capacity of rubber processing factories in Laos is still far behind neighbor countries; the existing rubber processing in Laos is in the form of liquids and sheet rubber, usually the latex can be processed and marketed in several forms and grades. The most common forms are sheet rubber, crumb rubber, crepe rubber, cyclized rubber, and superior processing rubber, block rubber, and preserved filed latex and latex concentrates (Opeke, 1982; RBI, 2005). Most rubber smallholders in Laos process the latex into 'tub lump' and for the rubber smallholders in Malaysia, Thailand and Sri Lanka process their latex into sheets. Some is dried in a smokehouse and sold as ribbed smoked sheet (RSS), but most is purchased from the farm as dry un-smoked sheet and processed to RSS somewhere else.

In Malaysia smoking is generally undertaken at the village level. In Sri Lanka, most rubber is smoked before being sold to official government rubber buying central in the local areas. In Thailand the trading system is different. The market chain starts from travelling traders who may in fact buy at the farm gate price, through small town vendors, to the final stage of the chain where rubber sheets are smoked by the traders with very large smokehouses, and who then grade, pack and export the sheet as RSS (Blencowe, 1989).

In Laos as found in many places from the north to the south, Rubber farmers did not process their rubber before selling. They just made 'tub lump' rubber and sold it to Chinese traders who came to buy at the village. Two main techniques are used for processing raw latex into tub lump rubber (Manivong V., 2007). The first technique involves using plastic buckets. First, latex is poured into a sizeable plastic bucket and left for about 24 hours. The latex liquid solidifies as a bucket-shaped lump and then the tub lump is taken out and kept in a safe place, usually in the rubber plantation. The weight of tub lump rubber is about 30-50 kg, depending on the size of bucket. If the raw latex is mixed with formic acid, the liquid solidifies faster, but no rubber farmers used formic acid, to reduce the cost of processing. The second technique of making tub

lump is by using a plastic bag. First, a hole is due to the same size as the plastic bag. The plastic bag is placed in the hole and raw latex is poured into the bag. The latex in the bag is left for about 24 hours to solidify. After that the tub lump in the bag is taken out and kept in a safe place. Tub lump rubber in a plastic bag also weighs about 30-50 kg, depending on the size of the bag.

2.5 Economic impact from rubber production on smallholder farmers

2.5.1 Income from tapping latex

In 2011, NAFRI has analyzed the benefit returns and economic values from the rubber plantation during 25 period years of investment. The result shows that the production cost of 1 ha was about 172.5 million KIP, the total income from selling latex was about 426.6 million KIP and net profit of 254.1 million KIP, or about 10.2 million KIP/ha of net profit annually. The income from the third year of tapping latex was 22.5 million/ha/year. If compare to other commercial tree plantations the investment in rubber provides high benefit return than Teak and Eucalyptus (5.7 million KIP/ha/year and 0.5 million KIP/ha/year) but less compare to coffee with the benefit return of 15.2 million KIP/ha/year.

In addition, when comparison the ratio of income and production cost the rubber provides a high benefit return of about 2.47 million KIP/ha, 2.06 million KIP for teak and 1.77 million KIP for Eucalyptus. However, the research shows that while the rubber provide high income but it also required intensive labor during the tapping latex for about 9 months per year (more than 8 hrs. /day including work in nigh time) and farmers have to wait up to 7 years for first tapping latex. Unfortunately, limited research shows the labor cost per ha per year.

2.5.2 Income from wage in the rubber concession plantation

The income of smallholders who involved in the rubber plantations in the contract farming model (2+3 and 1+4) and rubber concession plantation is different among rubber plantation provinces. In case of Champasack province, Ian G. (2010) found that the temporary workers are received 25,000Kip (US$3.1)/day, but in reality many only obtained 18,000Kip (US$ 2.1)/day. The permanent work with received some of 300,000-500,000 Kip (US$40-60)/month for maintenance of plantation. In case of labor wage in the northern plantation is about 500,000-1,000,000 Kip (70-120US$)/month that higher than the wage in the south plantation (Khamphone, B., 2009). François (2007) found that Vietnamese workers are paid about 60 % higher than Lao workers for similar task. In case of LouangNamtha province, the wage of a temporary worker on digging hole to transplant seedling was 1000-3000 Kip/hole and weeding wage is 500-1000 Kip/tree(30,000 Kip/day/person) depending on soil surface or equivalent to 450,000Kip-1,350,000 Kip/ha for digging hole and 225,000-450,000Kip/ha for weeding. However, please keep in mind this kind of work is not regular work that farmers can do it every day.

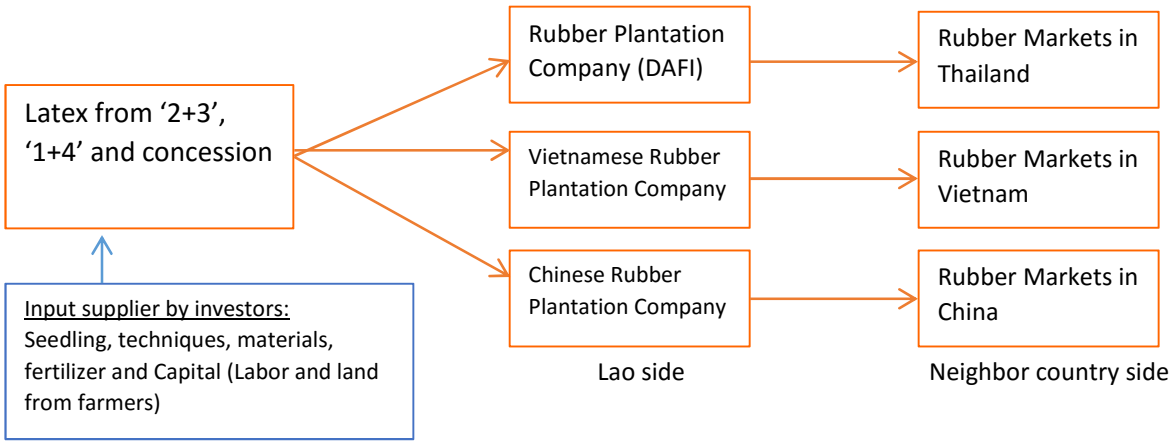
In 2007 a study was conducted on income impact from rubber plantation and the result shows that during 1994-2004 the household income of selected villages (LouangNamtha) was 700,000 Kip/household/year, then after tapping latex the income increased to 3.5 million Kip in 2007. Another study on economic impact from rubber found that the main household incomes are from gardening, livestock and shifting cultivation before planting rubber trees. The average household income is about US$140 per month. With rubber tree plantation, the monthly household income is increases to about US$210 per month (Saykham, 2009).

2.6 Smallholder Rubber in Value Chain

2.6.1 Structure of the Rubber value Chain

The structure of value chain will discuss in separate between individual/smallholder rubber plantation and contract farming and concession by private companies. The figure 19 shows the value chain mapping of rubber plantation by contract farming and concession models.

Figure 17: Value Chain of Contract and Company Concession in Rubber Plantation



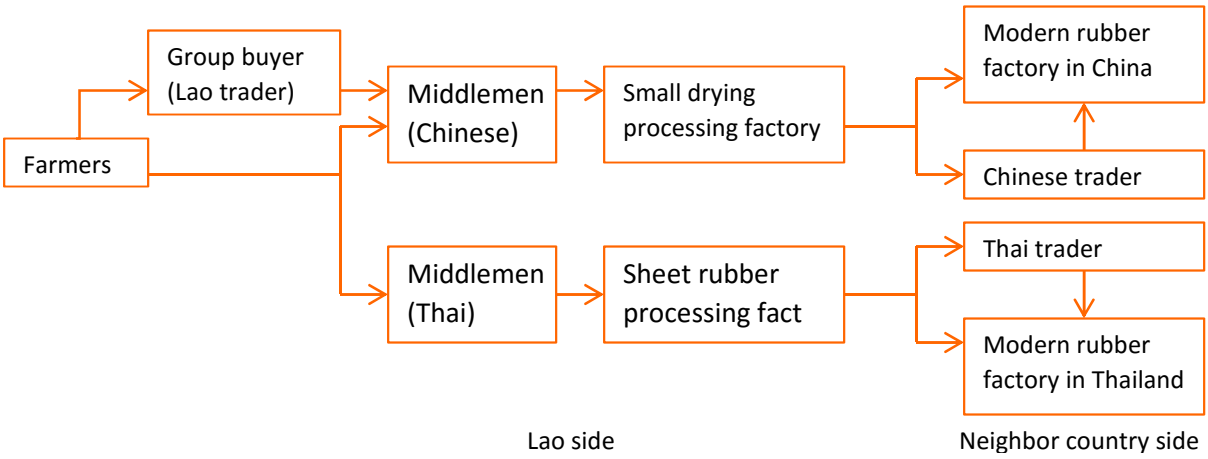
Source: Author, 2015

The value maps in this stage present the flow of latex from the rubber producers (company + farmers) under contract farming and 100% concession. The neighbor investment companies play important role on input supply namely, seedling, materials for digging and tapping latex and the capital is also provided for hire labor. For the middleman mainly from the neighbor countries, a Chinese company is likely influent in the north and Vietnamese invests in the south, for Thai company investor found in the central part. These investment companies invested in both planting their own rubber plantation and buying latex from individual rubber farmers, then processing and export to the factories in their countries. For the map of individual rubber farmers will discuss by separately in regions as below:

Individual Rubber Farmers in the north provinces

The main market in the north is mainly exported to China and Thailand (NAFRI, 2011); Rubber was mainly exported in the form of 'tub lump' rubber and very few of farmers processed the 'sheet rubber' and sold it to production group (rubber buyer) at the village level and some directly sold to Chinese and Thai traders who came to buy at the village. After that middlemen sold it to processing factories in the province and final stage it is exported to China and Thailand for further step of processing. See figure 20.

Figure 18: Value Chain of Individual Farmer Model in the Northern Provinces

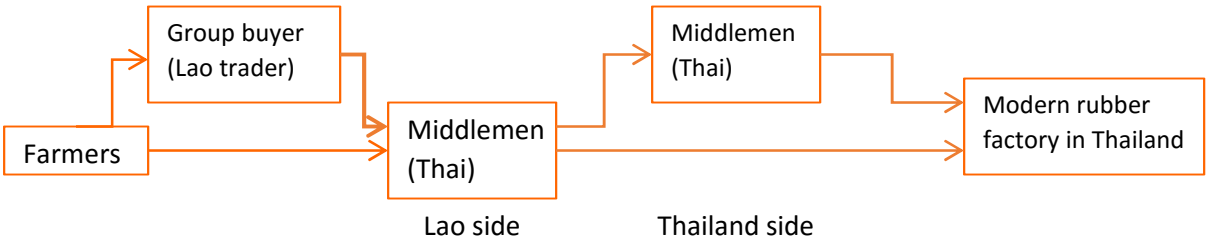


Source: Author modified from NAFRI (2011), 2015

Individual rubber farmers in the central provinces

Figure 21 shows the rubber market in the central part of Laos, whereonly export to Thailand and mainly from the Bolikhamsay and Khammouan province, the product of rubber is the form of tub lump latex. The rubber products are sold to the Lao traders at the plantation, or it was directly sold to Thai middlemen, then it was export directly to Thai middlemen/merchant or a rubber-processing factory in Thailand.

Figure 19: Value Chain of Individual Farmer Model in the Central Provinces

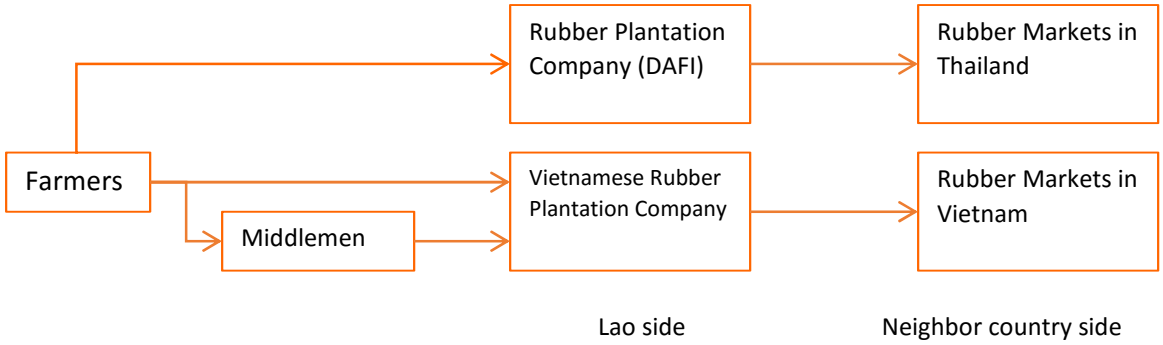


Source: NAFRI, 2011

Individual rubber farmers in the south provinces

The rubber market in the South (Champasak province) has two major buyer companies/markets to buy and export rubber to Vietnam and Thailand markets. The rubber plantation company called DAFI buys the tub lump rubbers directly from rubber farmers and export to rubber markets in Thailand. For the Vietnamese rubber Plantation Companies buy rubber from both middlemen and rubber farmers and then export to rubber markets in Vietnam. It is also reported that some of rubber products from Laos is processed in Vietnam and then exported to rubber processing factories in China.

Figure 20: Value Chain of Individual Farmer Model in the Southern Provinces



Source: NAFRI, 2011

2.6.2 Institutional Rubber Production and Industry

Rubber Committee:

Laos has no specific organization to responsible for rubber sector, no rubber association and no national rubber committee. However, government of Laos and international development partners has been emphasized to develop rubber sector. Recently, the Ministry of Agriculture and Forestry has submitted the proposal to Prime Minster Office on consideration of the Laos to be a member of ANRPC[9]. However, up to now has no progress on ANRPC member, that maybe Lao has several limited issues such as: unclear of term and references for representative rubber organization in Laos, and the rubber plantation in Laos is the mostly belong to both domestic and international investment companies, and smallholder farmers with scattering plantations.

Benefit of ANRPC (member countries):

There are three main benefits that a member will receive from the ANRPC, a) Accessibility of market information on natural rubber industry; b) facility and service on rubber exportation; and c) collaboration of policy identification.

a) Accessibility of market information on natural rubber industry:

The ANRPC consists of 4 technical committees, namely statistic and information committee; industry committee; exporters group (demand and supply analysis); and expert group on environmental friendly rubber production. The ANRPC does not only provide and share the market information such as global and domestic price among the member countries but it also provides and shares the experiences and lesson learns of governance on rubber value chain, processing techniques, measurement of effective cost and rubber development strategy.

b) Facility and service of rubber exportation

[9]Association of Natural Rubber Producing Countries (website: www.anrpc.org)

The ANRPC promotes the rubber exportation of member countries and disseminates through the associations' website under board of committee. The facilitation will provide rubber importers countries access to rubber production policies of member countries.

c) Collaboration of policy identification.

The ANRPC facilitates in bargaining power and policy dialogs on rubber production sector. The one of priority the association will be supported and funded by Clean Development Mechanism (CDM) of Kyoto Protocol on against disaster from climate change. The ANRPC will also help member countries to solve the problems such as low productivity from climate change and low labor skill, poor processing technique, markets and other issues depending on requirement from a member country.

Rubber Production Group:

The rubber plantation in Laos is mainly in the form of stallholder farmer groups and the group managed their own production by selection of seedling, planting, harvesting and selling. Up to now there is no formal rubber production group in Laos. Conversely, there are some informal group has been established in the north, mainly in Hadyao village, LouangNamtha province. The group has function to facilitate the rubber purchasing and negotiating with Chinese traders in the village and borders on rubber price. After agreed on price the group will inform village authorities and rubber farmers in the villagers to prepare and sell their products. The procedures on purchasing in Laos side will be responded by the group (NAFRI, 2009).

2.7 Smallholder constraints

2.7.1 Physical (land, infrastructure)

Before the "rubber boom", upland areas belonged to the community, but individual could occupy and use the land to meet their subsistence needs. After the harvest, the land would come back to the community; no-one occupied the land for long periods. Traditional land ownership and use has now changed, with occupation continuing and land being sold on. This may lead land shortages for some communities and land conflict between villagers themselves, as well as between villagers and companies and between companies. Cases in Champassak Province show this to be happening already (Ian, G., 2010).

2.7.2 Economic

According to Minivong (2009) there are two phases in the growing of rubber – the immature or establishment phase and the mature or production phase. The immature phase is when the rubber trees are providing no latex, usually lasting about 6 to 7 years after planting. During this stage expenditure is incurred on planting and maintenance of the rubber tree but there is no return, except the returns from intercrops if intercropping is practiced. In addition, according to Simone, V. et al (2007) found that most smallholder farmers planting rubber on their own are wealthier farmers that have money and labour to invest. Thus, most farmers did not express concern about food security during the earlier years of planting. However, as rubber rapidly expands into forest and livestock grazing areas, there is concern that relatively less well-off families depending on NTFPs for food and household income will have less option to ensure food security.

The individual farmers have usually faced problem during the first year of tapping due to they did not know whom to sell to (unless they practice contract farming model), what the market price is or how they will sell their products. According to the review of works found that farmers are also unaware of the regional trade conditions, such as import tax imposed by the Chinese. Furthermore, there is little discussion on alternatives to rubber and different ways rubber can be introduced to maximize per labour productivity but minimizing environmental and economic risks particularly for the poor families in rural areas.

When the rubber trees are trappable or in the mature period, there are returns of latex production until the end of their productive life, normally up to 35 years or even more. The smallholder often fact with high production cost of material cost and labor cost. These costs are incurred throughout the life of rubber plantation. In the establishment stage, the major materials used are planting materials, fertilizers, and weedicide. In the mature period, the materials used are tapping materials (mangles, cups, spouts, tapping knife, pails, pan, headlamp, and formic acid) and processing materials including the establishment of a smoke house and its maintenance (DoA, 1985).The primary output from a rubber plantation is the latex. Hence there is no economic return from rubber trees during the immature period. In the mature or tappable period, the rubber trees can produce latex, the yield of which will increase over the first few years, then plateau, and finally decline (Grist et al., 1998). However, during the unproductive immature stage, intercropping provides an essential way of increasing not only land-use efficiency but also income (Rodrigo et al., 2001).

2.7.3 Social (low labor productivity and education)

According to the results of previous studies in many areas have indicated that the rubber is often planted in rice fields and fallow areas. This could lead to increasing food insecurity and the loss of forested areas,

which supply NTFPs for food and income generation, will contribute to this problem.

Farmers are facing a number of challenges in producing food in a sustainable manner as well as in diversifying from their dependence on cereal production to the production of high-value commodities. Although some of these challenges affect both large and small farms, there is evidence that they apply more strongly to small farms. For example, small farmers cannot take advantage of higher food prices by expanding production if they have difficulty in accessing services and credit. Similarly, when new technologies require higher capital inputs or mechanization, small farmers may be at a disadvantage unless they are helped in reducing their transaction costs to access inputs, credit and marketing facilities (Thapa, 2009).

2.7.4 Production and post-harvest techniques

During the planting period farmers and district staff lack information and knowledge in terms of planting and managing rubber (characteristics of different clonal varieties, managing pests and disease and understanding how to carry out transplanting), and during period of tapping lack of techniquesin term of tapping latex and processing. While many farmers are practicing intercropping in the first years (before the canopy closes), it is also uncertain how the farmers will offset income during the years before tapping (Simone, V., et al, 2007). Rubber produced by smallholder farmers is often unreliable in quality. Some of them do not process their rubber, for example in Luangnamtha Province. Low quality and unprocessed rubber is often paid at much lower price which up to almost 33% (Douangsavanh et al, 2009). This leads to low income of the households. Some of the problems in marketing also include limited access markets and market information.

One of the Government's major concerns is food security of the smallholders planting rubber, especially during the first 6 years before harvesting. Some of them can manage by applying intercropping with food and cash crops such rice, maize, and pineapple during the first 3 years. However, from the fourth to sixth year, the smallholders usually have high risk in facing food insecurity, since the rubber plantation area cannot be intercropped.

A large rubber concession also affects local communities of smallholders. A number of studies indicated that it has both environmental and social impacts such as loss of biodiversity, soil erosion, soil and water contamination, loss of land and access to land, loss of income sources, and social conflict. Since, Lao PDR consists of different demographical and environmental conditions, smallholder rubber farmers in lowland and upland areas may face the above problems and challenges differently. This is very interesting to investigate and find suitable policy to support them.

2.7.5 Labor problems

The individual rubber plantation is based on household labors and less problem compare to labor who works in the concession rubber plantation. Villagers have faced various labor problems, and a number of labor issues have emerged that made villagers unhappy. According to Ian G. (2010) who studied the impact of rubber plantation in Southern provinces revealed that the rubber company required the labor age between 18-35 years old and some companies allowed 18-45 years old. Thus, older and younger farmers are being excluded and make difficult to the families who has limited on the requirement age.

However, some company allowed under aged teenagers to work, and many have quit school to labor in the plantation to support their families. Labor always claim that they are not receiving full payment for the work, paid less than originally agreed rates, work long hours (with violates the Lao Labor Law 1994 and

2007). Luangaramsi et al. (2008) also found various labor problems associated with rubber plantation development in Bachieng district. Apart from receiving low wages, they found that amongst the non-permanent villager laborers, the average number of working days per year was less than a quarter of the working year, thus making it very difficult for people to make a living through working on the plantations.

2.8 Managing Risk

The risk coping by stallholder rubber is still low behind their need and mainly need for improving market risk, productivity risk, and financial risk. Therefore, the coping risk is needed from multi-stakeholders involve in the action. As currently, the government supports smallholder rubber farmer more than concession in term of market and technique through the development projects such training, providing basic equipment and so on. The government stopped the land concession for rubber and mining since 2012. For the existing concession area is needed to review and evaluate the impact on socio-economic of local people and review the fee of concession. The total rubber plantation area should not more than 350,000 ha in the future in order to reduce the risk and to secure the price and quality (NAFRI, 2011). In addition, another support is the facilitation of selection seed and low credit policy.

III. POLICY ANALYSIS

3.1 Review of Related Policy on Rubber Production

There are currently no specific policies and laws on the rubber production. While, the rubber production is integrated by several government policies, which aims to improve smallholder livelihood and poverty reduction. For example, in the investment policy has mentioned that Laos a country with relatively abundant land resources and long period of land concession from 5 to 99 years. This represents a significant opportunity and clearly to attract foreign investment, by aiming to contribute to the reduction of poverty and improvement of living standards of smallholder in rural areas. In addition, as based on several authors have mentioned that the rapid development of rubber plantations is leads to social and environmental impacts more than improving livelihoods, particularly those related to watershed protection, cultural change and livelihood security in rural areas. The key policies and laws relevant to the rubber production are list below:

3.1.1 The Investment Promotion Law

This law identifies rubber plantations as a sub-set of agricultural production. Plantations are widely promoted utilizing numerous incentive measures, such as reduced income and business taxes and a longer tax holiday in comparison with investments in other sectors. Investment in the Lao agricultural sector is open to all domestic and foreign investors, and investors are able to lease land for longer time periods and at a cheaper price. The export of agricultural products is tax-free, while the import of agricultural machinery and equipment is subject to a low tax rate. The Investment Promotion Law also targets investment in rural and mountainous areas where infrastructure is underdeveloped, offering lower tax rates and an even longer tax. In the case of rubber plantations, where rubber harvesting generally begins seven or eight years after planting, the profit latex exemption can therefore last up to 14 or 15 years.

The missing gap, the policy is do not take into account for promoting integrated farming, intercropping and

agro-forestry systems that should be considered within the development mix of options in order to reduce risk of smallholders. In addition, there is no monitoring of how current contracts are implemented contracts and concession lack supervision, jeopardizing potential returns and placing farmers in economically risky situations.

3.1.2 Land policies and laws

Article 3 of the Land Law (2003) defines land as national property in accordance with the Constitution. This empowers the state (i.e. the National Land Management Authority, NLMA) to manage land and to allow individuals, households and organizations to utilize land. Article 7 prohibits the arbitrary occupation of land: those who want to use land have to ask for permission from the NLMA. According to the Land Law, concessions equal to or less than 3 ha can be processed at the district level, those equal to or less that 100 ha at the provincial level, and those equal to or less than 10,000 ha can be processed at the central level. Concessions exceeding 10,000 ha require approval from the National Assembly. Individuals or organizations are able to lease land for a maximum of 30 years (this is renewable). The law is favorable for investments in plantations such as rubber and provides access to land for all foreign and domestic investors. However, the land concession for rubber plantation, eucalyptus and mining has been prohibited by decree of Prime Minister No. 13/PM, dated 11 June 2012.

The missing

3.1.3 The Environmental Protection Law

This law requires an environmental impact assessment to be carried out for any investment project, including rubber plantations. The Law empowers the Water Resources and Environment Administration (WREA) and now knows as the Ministry of Natural Resource and Environment(MONRE) to conduct EIAs, to issue environmental certificates, and to monitor and evaluate the environmental effects of any investment project. MONRE is also able to suggest to other agencies concerned measures to mitigate impacts or even to halt investment projects temporally or permanently, should the project have significant negative effects on environment and human health. This is in accordance with the Investment Promotion Law.

3.1.4 The Forestry Law

The Lao PDR Forestry Law strongly prohibits the clearing of “primary forest” and “secondary forest” for agricultural production, especially for large-scale production. According to the Law, large-scale plantations are only allowed on “degraded forest areas” and on “non- forest areas”. The Water and Water Resource Management Law (1996) also prohibits clearing watershed areas for plantation purposes (Articles 14 and 31). The Law was revised in 2007.

In the forest strategy the plantation is allowed in the fallow areas and poor production forest areas. The target of plantations is must reached to 600,000 ha in 2020 that including rubber plantation, teak, eucalyptus and other industry trees.

3.1.5 The Agriculture Law

This law allocated the rubber plantation projects plant on the degraded and non-forest areas. In addition, the Law promotes to use the environmental friendly techniques and technologies in the plantation, namely bio- fertilizers and bio-insecticides (Article 12). The Law limits and prohibits the use of chemical fertilizers

and insecticides that have negative impacts on the environment including soil quality, water quality, biodiversity and human health. The Management of Fertilizers Regulation (1503/MAF 2000) and the Regulation on the Use of Insecticides (1578/MAF 2000) also prohibit the use of products that have significant negative impacts on the environment and human health. They determinate quality standards, list of chemical fertilizers and insecticides that are allowed to produce, import and use within the country.

3.2 Policies Gap to Benefit of Smallholder Perspective

Laos lacks specific promotion policies in smallholder as well as the rubber sector. But, there is some policies and regulation to support rubber production in Laos as the evidence for incentives are being provided at the national and provincial level. For example, low interest rate credit policy and at the provincial authority saw an opportunity in the "rubber boom" to reduce poverty and stabilize shifting cultivation (Shi, 2008). In the early days of the boom, in case of LuangNamtha province authorities provided technical assistance and allocated specific funding to provide low interest credit[10]of 1-3 million Lao Kip in total per household, in order to assist household to purchase seedlings and other supplies (Douangsavanh et al, 2008).

In December 2003, the LuangNamtha government made the first attempt at engineering and regulating investments in rubber on broad scale, enacting Regulation No. 34 on General Model of Investment in Rubber Plantation Sector. According to this regulation, investors may invest in the sector through either concessions or contract farming. LuangNamtha has since strongly promoted the "2+3" contract farming model, and since October 2005 the three northern provinces of LuangNamtha, Bokeo and Oudomxay have stopped issuing land concessions (Shi, 2008), and June 2012 GoL has stopped issuing land concession at country level.

The GoL stands on promoting the expansion of rubber production for addressing endemic poverty amongst communities. This is based on successful story from the neighbor countries and some village in Laos (Hadyoa village) and belief that the tapping and production of rubber is a viable household industry that does not require large investments in labor and that there is significant market demand and a rubber that would replace unregulated swidden/slash and burn systems. The production of rubber fits well with the concept of contract farming in that prices are set in advance and therefore households potentially have secure and reliable income streams. In addition, government of Lao confidents the rubber production provides itself to intercropping in the early years of plantation establishment before canopy closure (1-4 years), therefore allowing farmers to make a living through crop diversification.

However, there are gap to benefit rubber smallholder. Why? Due to lack of enforcing and monitoring the implementation of policies related to rubber development. Rubber is different from other commercial crops (cannot convert to food if no market) and needs substantial organization and institutional support at all levels. This could include national strategies integrating technical issues, extension, credit, transport and marketing. All rubber producing countries there is a governing and coordinating body that works closely with all sectors related to the rubber industry. At the local level, smallholder farmer groups need to be organized and supported in order to strengthen rubber cultivation, tapping, processing and marketing.

[10]Loans at the fixed rate of 2% p.a. for 15 years; from 1995 onwards, the fund was administered by the Agriculture Promotion Bank (APB) at the fix interest rate of 7% for 15 years.

These institutional arrangement need to be considered by policymakers as an imperative to support the sustainability and economic viability of the sector.

IV. CONCLUSIONS AND POLICY RECOMMENDATIONS

4.1 Conclusions

The rubber plantation expansion has so far been driven by the strong demand for natural rubber in key rubber producing and processing countries, such as China and India, and by the high price for natural rubber in recent years. The price of rubber is unpredictable overtime and it dependents on trends in the global economy. Global consumption of natural rubber declined by 8% in 2009, as a result of the economic downturn, but quickly recovered in 2010. The global consumption of natural rubber was 5.18 million tons in 1990 and increased to almost 11.4 million tons in 2013 and 12.1 million metric tons in 2014. While, the rubber plantation areas in Laos has rapidly increased from 900 ha in 2003 to 28,574 ha in 2007, and extremely increased to 261,000 ha in 2014 and it is predicted to be 300,000 ha in 2015. In case of Lao PDR, with its geographical proximity to key rubber markets, suitable environmental conditions and relative abundance of land resources, is well placed to profit from this demand.

According to the review numbers of related studies on rubber production, it is clear that rubber cultivation offers a number of benefits to smallholder rubber farmers in Lao PDR, namely: increased incomes for rural people; stabilization of shifting agriculture; potential value-added through processing; the development of infrastructure and a more market-based economy in the regions; and the expansion of economic connections with its neighbors. However, these studies have also shown that the promotion of rubber brings challenges for smallholders and investors. According to the reviewed studies the concession model should be reconsidered, especially for the plantation development in southern provinces. As well as promoting in large-scale rubber plantations, villagers lose ownership and access to agricultural and forest land resources. However, some large-plantations bring potential earning income to smallholder who has limited option for earning income and lacks agriculture. Many studies found that the wage as a plantation laborer is not an adequate substitute and investor did follow the original agreement of wage rates.

The contract farming models as currently practiced in Laos should also be improved to ensure a more equal sharing of risks and benefits between farmers and companies. The contract farming bring job opportunity to villagers, provides greater ownership and security for farmers on market and income, hence its promotion by the GoL. While, concession production model provide low income through the wages (seasonal work), overlapping and unclear land designation, labor shortage, lack of alternate income source for remote villagers.

The contract-farming model ‘2+3’ is more appropriate and brings benefit to farmers more than ‘1+4’ model. The smallholder rubber farmer model (individual/household farmer) is appropriate for the families who have sufficient land for other agricultural production and financial capacity on farm maintenance. Therefore, based on review related studies, the recommendations include: ensuring that an acceptable latex price is set down in the contract; and more strictly enforcing the “2+3” model or similar as a minimum standard for benefit sharing. Rubber planting companies may offer a solution, ensuring access to land and livelihood for farmers, while offering companies a higher level of control over a portion of their plantations. Some studies also recommend in particular that a land taxation system should be introduced, where land tax per hectare increases with increasing land ownership. Although allowing more intensive cultivation, very large parcels of land would therefore attract more tax, and the tax should return back to villagers who leave nearby plantation to promote smallholder farming and improve their livelihoods.

The income of smallholder rubber farmers from the third year of tapping latex was 22.5 million KIP/ha/year or about 1.8 million KIP/ha/month. However, the research shows that while the rubber provide high income but it also required intensive labor during the trapping latex for about 9 months per year (more than 8 hrs. /day including work in nigh time) and farmers have to wait up to 7 years for first tapping latex.

The income of farmers who in the rubber concession plantation found that the temporary workers are received 25,000-30,000 KIP (US$3.1- US$4)/day and the permanent work with received some of 300,000-500,000 Kip (US$40-60)/month for maintenance of plantation. In case of labor wage in the northern plantation is about 500,000-1,000,000 Kip (70-120US$)/month that higher than the wage in the south plantation. However, please keep in mind this kind of work is not regular work that farmers can do it every day.

4.2 Policy recommendations

In order to develop a viable and pro-poor rubber sector in Laos to be more effective and positive impact to improving smallholder livelihood there are a number of factors that need to be addressed:

4.2.1 Institutional Management

The following recommendations are drawn based on the missing policies that take into consideration smallholders' perspective.

1) The cooperation mechanism among government agencies and actors along the value chain is needed to discuss and leaded by Ministry of Industry and Commerce.
2) Promote to establish the rubber production group or rubber association at regional level to assist rubber farmers access to market and strong in bargaining power.
3) Establishment a specific rubber committee or Lao rubber board to advice the development sector and production of rubber in Laos. Stakeholders from various sectors must integrate in the committee.
4) Set up a unit or agency at central and provincial level to respond and facilitate rubber strategic plan and to determine legislation and policies on the rubber production, promotion and marketing managements.
5) Establish the rubber extension service and demonstration center at regional level. For example, Technical facilitation service center and training center for smallholder rubbers in the Northern provinces.
6) Promote Laos to be a member of Association of Natural Rubber Producing Countries (ANRPC) due to it does not only provide and share the market information such as global and domestic price among the member countries but it also provides and shares the experiences and lesson learns of governance on rubber value chain, processing techniques, measurement of effective cost and rubber development strategy.

4.2.2 Rubber Investment

1) Government should issue the legislations or law on contract farming to ensure the benefit sharing between rubber smallholder and contractors.
2) Reconsider the land concession and should continue to ban the land concession for rubber production in Laos as based on decree of Prime Minister No. 13/PM, dated 11 June 2012.
3) The total area of rubber plantation in Laos is should not exceed than 350,000 ha, if not it will significant has a negative impact on other land use covers, namely forest covers, pasture land and other agricultural production areas.
4) The existing contracts of rubber concession are needed to review and revise as based on regulation

and provision of GoL on the concession fee no. 02/PM. The mechanism of review can be done by set up the committee at central and provincial level, the member of committee must be involved from policy making and implementing agencies.

5) If necessary to promote rubber plantation in future, the '2+3' model is more appropriate due to avoiding intensive import labor from neighbor countries, market risk for smallholders and the contract must be under consideration of Lao rubber board.
6) In the contract or agreement license of rubber production, the policy of food security must be in placed such as integrated farming, intercropping and agro-forestry systems should be considered within the development mix of options in order to reduce risk to smallholders on food and economics.
7) Investors should be provided with guidelines and standardized contracts, as Lao PDR lacks clear investment policies and guidelines must be cleared before

4.2.3 Food Security

1) The future investment, the contract or agreement license of rubber production must be considered the policy of food security such as the smallholder rubbers should not use all land area to plant only rubber (mono-cropping) and must be keep the other areas to grow agricultural crops or intercropping in the rubber plantation during 1-3 years. This is to help farmers in food security during the years without income from latex.
2) The existing smallholder plantation owners, under contract 2+3 or 1+4 and especially the plantations don't tapping latex yet, the local government and rubber investors should find and allocate other farm or off-farm jobs to their householder members. This may help the smallholder rubbers access to food through the wage income.

4.2.4 Financial and Marketing

1) Finance and credit are extremely important aspects of the package for smallholders credit mechanisms need to be integrated into the rubber development plans from the outset.
2) The importance of favorable credit support systems have been clearly demonstrated in the analysis of current rubber systems in Laos and without this support, the economic capability of smallholder rubber producers would be turned to risk and vulnerability.
3) Formulation of the production group, buyer group for smallholder rubber farmers and to be member of rubber organization that can help them to access market and other necessary information on rubber. In addition, the production group will bring the individual farmers who have no contract farming or no promising marketing
4) Establishment of rubber bank to subsidize and stock the rubber product when the price increase, the government will responsible for initiative period and after that will hand over to private sectors.
5) The PPP (Public Private Partnership) model must be applied to support the existing smallholders rubber farmers and private sectors to install the rubber processing factories both semi processing and modern (final product) processing factories such as tyre factory and other products that use natural rubber as main input
6) The public banks: Nayobai Bank and Agricultural Promotion Bank would provide the low or appropriate interest rate to smallholder for their basic investment on processing of sheet rubber must be promoted to practice in smallholder household level.
7) Reduce the uncertainty of rubber latex market at village level through: 1) promising marketing between private buyers (companies) and production group in the village and 2) direct contracts between rubber production group and processing factories from neighboring countries (along the

borders)

8) As currently the rubber latex exports to China are mostly informal trade, the Ministry of Industry and Commerce should lead to make actively negotiation with China to include the rubber latex into the list of ASEAN Tread in Goods Agreement (ATIGA), which already covers five crops (corn, watermelon, banana, dry cassava and rice).
9) The sheet rubber must be promoted to practice in smallholder household level. To do so, the strengthening microfinance is important tool to improve access to finance of small plantation farmers. In addition, District Agriculture and Forestry Office should provide rubber processing technical training to farmers before getting loans in order to guarantee the effectiveness of credit utilization.

4.2.5 Labor support

1) The wage from the rubber concession companies is very important for the smallholder families who have limited land and income. Thus, public sector should develop and promote the technical labor skills, which determine policies and regulations in the large-scale rubber investment of both domestic and international companies. The raw labors (no experience on tapping latex labor) are needed to train the technique of tapping that could help them to competitive able with labors from neighbor countries.
2) The public sectors (provincial of agriculture and forestry office, and provincial of labor and social welfare office should formulate the development center skill on rubber tapping to organize training and facilitate to smallholder farmers. This center might be located in the extension service centers.
3) All provincial and district branches of the Ministry of Agriculture and Forestry and Ministry of Labor and Social Welfare will promote raising awareness of labor standards in the rubber sector through their routine training, capacity building and information campaigns.
4) For the Northern provinces is in high risk of labor shortage, thus may need to import labors from neighbor provinces and it is necessary to work integrating with the labor and social welfare sector at all levels.
5) The labor law is needed to disseminate to the rubber investors and the law can represent a powerful tool for Lao labor protection.

4.2.6 Environment issues

1) The future rubber plantation is needed to apply the agro-forest technique to their rubber plantation to improve the biodiversity in the plantation, and the plantation is must far from the water sources at least 50-100 m to avoid the waste or chemical drain into water source
2) The existing plantation should encourage to build the latex storage to protect air pollution in the community
3) Up to now lack of evidence on negative impact of rubber plantation on environmental issue, thus it is necessary need to conduct survey and evaluate the environmental impact to soil, water, air, biodiversity, human and community. The result of evaluation will provide guideline and measurement to address the problems.

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Summary of policy recommendations for pro-poor rubber smallholder farmers

Region / Policy	Measures			Main Responsib
	Individual farmers	Contract	Concession	
(1) Rubber Management	(1.1) Establishment a specific rubber committee or Lao rubber board to advice the development sector and production of rubber in Laos.			MAF (NA PAFO, DA
	(1.2) Set up a unit or agency at central and provincial level to respond and facilitate rubber strategic plan and to determine legislation and policies on the rubber production, promotion and marketing managements.			MAF (NA DAEC), PA DAFO
	(1.3a) Promote to establish the rubber production group or rubber association at regional level to assist rubber farmers access to market and strong in bargaining power.	(1.3b) Contract enforcement, reconsider and develop the contract to ensure the fair benefit sharing between farmers and companies	(1.3 c) Local government is needed to intervene and solve the unfair the payment for Lao smallholder labor who work in the rubber plantation	MAF (DA NAFRI), PA DAFO
	(1.4) Establish the rubber extension service and demonstration center at regional level. For example, Technical facilitation service center and training center for smallholder rubbers in the northern provinces.			MAF (DA
	(1.5) Consideration of ANRPC membership, Laos will get positive benefits through the cooperation and expertists, sharing information and statistic of rubber industry in the global scale.			MAF (NA DOPC
(2) Rubber Investment			(2.1) Reconsider the land concession and should continue to ban the land concession for rubber production in Laos as based on decree of Prime	MAF (NA DAEC, DAI

Region / Policy	Measures			Main Responsib
	Individual farmers	Contract	Concession	
			Minister No. 13/PM, dated 11 June 2012.	
	(2.2) The total area of rubber plantation in Laos is should not exceed than 350,000 ha, if not it will significant has a negative impact on other land use covers, namely forest covers, pasture land and other agricultural production areas.			MAF (NA DOPC
		(2.3a) Promote '2+3' model due to appropriate with current situation by avoiding intensive import labour from neighbor countries; market risk for smallholders and the contract must be under consideration of Lao rubber board.	(2.3b) The existing contract of rubber concession are needed to be reviewed and revised as based on regulation and provision of GoL on the concession fee no. 02/PM	MAF (DA
	(2.4) For the smallholder rubber should not use all land area to plant only rubber (mono-cropping) and must be keep the areas to grow agricultural crops or intercropping in the rubber plantation during 1-3 years. This is to help farmers in food security during 7 years without income from latex.			MAF (DAL
(3) Marketing and Trade	(3.1) Formulation of the production group, buyer group for smallholder rubber farmers and to be member of rubber organization that can help them to access market and other necessary information on rubber.			MAF (DA
	(3.2) Establishment of rubber bank to subsidize and stock the rubber product when the price increase, the government will			MAF (DAEC

Region / Policy	Measures			Main Responsib
	Individual farmers	Contract	Concession	
	responsible for initiative period and after that will hand over to private sectors.			
	(3.3) Government should set in priority to support and install the rubber processing factories both semi processing and modern (final product) processing factories.			MAF (DA MOIC
	(3.4) The sheet rubber must be promoted to practice in smallholder household level.			MAF (DA
(4) Labour issues	(4.1) The raw labours (no experience on tapping latex labour) need to be trained on the technique of tapping that could help them to competitive able with labours from neighbor countries.			MAF (DA
	(4.2a) The public sectors should formulate the development center skill on rubber tapping to organize training and facilitate to smallholder farmers. This center might be located in the extension service centers at local level.	(4.2b) Public sector should develop and promote the technical labour skills, which determine policies and regulations with the large-scale rubber investment of both domestic and international companies		MAF (DA
			(4.3) For the Northern provinces is in high risk of labor shortage, thus may need to import labors from neighbor provinces and it is necessary to work integrating with the labor and social welfare sector at all levels.	MLSW, M (DAEC
(5) Environment	(5.1) The rubber plantation should apply the agro-forest technique to their rubber plantation to improve the biodiversity in the plantation areas.			MAF (DC MONR
	(5.2) Smallholder rubber farmers			MAF (DA PONR

Region / Policy	Measures			Main Responsib
	Individual farmers	Contract	Concession	
	should build the latex storage to protect air pollution in the community.			
	(5.3) The plantation is must far from the water sources at least 50-100 m to avoid the waste or chemical drain into water source. Thus, it is needed to survey and sort list of the risk rubber plantation			MAF (NA
	(5.4) Lack of evidence on negative impact of rubber plantation on environmental issue, thus it is necessary need to conduct survey and evaluate the environmental impact to soil, water, air, biodiversity, human and community. The result of evaluation will provide guideline and measurement to address the problems.			MAF (NAI MONR
		(5.5) Regulation enforcement and environmental protection policies with investors who ignore the regulation and guideline.		MONR

- **Abbreviation:**
  - MAF = Ministry of Agriculture and Forestry; DOF = Department of Forestry, DOPC = Department of Planning and Cooperat Agricultural Extension and Cooperation, DALM = Department of Agricultural Land Management. NAFRI = National Agricultur
  - MOIC = Ministry of Industry and Commerce
  - MONRE= Ministry of Natural Resource and Environment
  - MLSW= Ministry of Labour and Social Welfare
  - APB = Agricultural Promotion Bank
  - MPI = Ministry of Planning and Investment
  - PONRE= Provincial Natural Resource and Environment
  - PAFO = Provincial Agriculture and Forestry Office, DAFO = District Agriculture and Forestry Office
  - PICO = Provincial Industry and Commerce Office, DICO = District Industry and Commerce Office