

Dynamics of rubber plantation in Lao PDR



Master Thesis

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MSc SUTROFOR

Under the supervision of:

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Georges Smekta (AgroParisTech Engref)

6th of May 2009
Montpellier

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Acknowledgements

To the villagers of Ban Nasa, Ban Nasaonang, Ban Phavi, Ban Vad, Ban Phouvieng, Ban Nakhom and Ban Khamboun. Thanks for your patience, for having accepted me in your home and shared stories about rubber.

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Summary

Intensive rubber cropping which is being heavily developed in Laos deeply transforms the Lao agrarian landscape. The CATCH-UP Program gathers information on landscape and livelihood changes, which combined with the study of driving forces, allows the elaboration of a comprehensive vision of the agrarian transition.

In this framework, this master's thesis reviews the dynamics of rubber expansion. In this way, several hypotheses were put forward. Firstly, the role of neighbouring countries, i. e. Thailand, China and Vietnam is considered as being decisive in the regional evolution of border areas. Secondly, the emergence of various rubber regimes would vary following local negotiations between stakeholders in this process, and also following the management of production factors. Finally, the innovation process *per se* would adapt to local realities, in particular the locally set up networks, as well as the authorities and institutional framework developed at the district level, which would explain the observed discrepancies in the process.

The methodology which was used with the purpose to determine the relevance of hypotheses is based on a multiplicity of sources. Review of the rubber boom process started with a review of literature, followed by a string of meetings with key persons, and the setting up of a semi-structured questionnaire.

This analysis allowed to draw a series of observations about the current process. For what concerns the regional rubber boom, the spatio-temporal process as well as the driving forces like kinship networks or the governmental policies of eradication of both opium and slash-and-burn technique are absolutely fundamental. At the local level, this study has allowed to notice the rising of rubber-related institutions through the regimes. The analysis has determined that the taking of decision of choices relating to rubber was marked by a strong uncertainty.

These results allow to elaborate some tracks for thought. The essential aspects of this agrarian transition are the management of agricultural diversity and the information available to the various stakeholders, the uncertainty they are facing and the management of their own risk. Finally, one has to give full consideration to the integrated planning of resources currently being developed, and more globally to the complexity of rubber system which is settling. Analysis developed along this research allows to identify three axes of thoughts: the information provided to the decision-makers should be improved, the management of information should be the subject of a strong emphasis, and the agrarian transition should be monitored in depth.

Résumé

N c " e w n v w t g " k p v g p u k x g " f g " p p e d e f a ç o n i n t e n s i v e u k " g u v " g
Laos transforme de façon profonde le paysage agraire laotien. Le programme CATCH-UP
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x k u k q p " f ø g p u g o d n g " f g " n c " v t c p u k v k q p " c i t c k t g 0 "

Dans ce e c f t g . " e g " o ² o q k t g " ² v w f k g " n g u " f { p c o k s
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régionale f g u " t ² i k q p u " h t q p v c n k ³ t g u 0 " F g w z k ³ o g o g p v
hévéciles varierait en fonction des négociations locales entre les acteurs impliqués dans le
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r t q e g u u w u " f ø - k p p g x a v k q p t g g t n w k " c w z " t ² c n k v ² u " n
o k u " g p " r n c e g " n q e c n g o g p v " c k p u k " s w ø c w z " c w v q t k v
du district, ce qui expliquerait les divergences observées de processus.

La méthodologie utilisée afin de déterminer la pertinence des hypothèses a reposé sur
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r c t " w p g " t g x w g " f g " n k v v ² t c v w t g . " r n s k l e f s , e t l a t " w p g "
o k u g " g p " r n c e g " f ø s t r u c t u r é s w g u v k q p p c k t g " u g o k

E g v v g " c p c n { u g " c " r g t o k u " f g " f ² i c i g t " w p g " u ²
G p " e g " s w k " e q p e g t p g " n ø g z r c p u k q p e m p o r e l a i n s i q u e c n g " j ²
les forces motrices comme les réseaux familiaux ou encore les politiques gouvernementales
f ø ² t c f k e c v k q p " f g " n ø q r k w o " g v " f g " n ø c d c v v k u " d
n q e c n . " n ø ² v w f g " c " r g t o k u " f g " e q p u v c v g t d e s n ø ² o g t
t ² i k o g u 0 " N ø c p c n { u g " c " f ² o q p v t ² " s w g " n c " r t k u g "
par une forte incertitude.

E g u " t ² u w n v c v u " r g t o g v v g p v " f ø ² n c d q t g t " f g u "
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s w ø k n u " o ³ p g p v 0 " H k p c n g o g p v . " k n " h c w v " t g v g p k t
développe et plus globalement la complexité du système hévécile qui est en train de se
mettre en place. Les analyses menées tout au long de cette recherche permettent de
distinguer trois pistes de réflexion < " n ø k p h q t o c v k q p " h q w t p k g " c w z
améliorée, la gesti q p " f g " n ø k p h q t o c v k q p " f g x t c k v " h c k t g "
transition agraire pourrait être surveillée de façon approfondie.

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Acronyms list

| | |
|------------------|---|
| ASEAN | Association of South East Asia Nations |
| CATCHUP | Comprehensive Analysis of Trajectories of CHange in the UPlands |
| CIFOR | Center for International Forestry Research |
| DAFO | District Agricultural and Forestry Office |
| DFID | Department for International Development (United Kingdom) |
| DPI | Department of Planning and Investment |
| GDP | Gross Development Product |
| GoL | Government of Laos |
| GTZ | Deutsche Gesellschaft für Technische Zusammenarbeit (Germany) |
| HDI | Human Development Index |
| IRD | Institut de Recherche pour le Développement (France) |
| IRSG | International Rubber Study Group |
| Lao PDR | N c q " R g q r n g ø u " F g o q e t c v k e " T g r w d n k e |
| LEAP | Laos Extension for Agriculture Project |
| MAF | Ministry of Agriculture and Forestry |
| NAFES | National Agriculture and Forestry Extension Services |
| NAFRI | National Agriculture and Forestry Research Institute |
| P I Q ø u | Non Governmental Organisations |
| ORRAF | Office of Rubber Replanting Aid Fund (Thailand) |
| PAFO | Provincial Agricultural and Forestry Office |
| R&D | Research and Development |

| | |
|-------------|---------------------------------------|
| REO | Rubber Estate Organisation (Thailand) |
| STR | Standard Thai Rubber |
| UNDP | United Nation Development Programme |
| USA | United States of America |

J k u v q t k e c n n { . " v j g " h k t u v " t w d d g t " r n c p v c v k q p " Champassak province, in the district of Bachiang. It had a size of 2 ha, and was never really exploited (Ketphanh & al., 2006). The rubber cultivation was then forsaken for a few decades, until the nineties. The first modern plantation (80 ha) was set up in 1990, in the Khammouane Province, in Thakek District. The company was a bit particular as it was under the responsibility of the Ministry of Defence. The purpose of this enterprise was to compensate the deforestation due to wood exportation to Russia. The training of a junior executive was performed in Thailand and the planning of the plantation carefully carried on. However, the company went bankrupt. The plantations were then taken over d { " h q t o g t " g o r n q { g g u . " y j q " f g x g n q r g f " v j g " g z r plantations remained for a while as a rubber enclave in the South, without interaction with the alongside farmers.

In 1994, the first significant step toward the rubber boom was achieved. Ban Had Nyao, a small Hmong village in Muang Sing, near the town of Luang Namtha became the first village to plant rubber (Alton & al., 2005). The farmers had kinship and ethnic links across the borders, which have been identified as the main reasons for the adoption of this new crop, by Laotians visiting relatives in Xishuangbanna (Yunnan) in China. These farmers received financial help from the local government in the form of subsidized loans¹ (Alton & al., 2005).

They started modestly, with 400 ha. The farmers started tapping in 2002. Since then, their plantations have grown and now account for 834 ha, producing 354 tons of rubber. Their plantations are at a distance of 1 to 5 km of their village. The first year of tapping brought farmers 4 millions of Kip on average per household, the second year 4.8 millions and the third 8 millions, due to the increase in latex price (Vongkhamor & al., 2007).

Although other villages in the Luang Namtha Province began to plant rubber around the same time with the financial and technical help of the province, the frost of December 1999 put an end to almost all the plantations, except Ban Had Nyao.

After a few years, the plants which had survived the frost started to produce in 2002 (Alton & al., 2005). The increased incomes induced by this regular production inspired other villagers to plant some rubber. Meanwhile, the farmers in Ban Had Nyao expanded their plantation again in 2004.

1.1 The agrarian transition in Laos: from subsistence to market-oriented agriculture

The Lao People's Democratic Republic (Lao PDR) is currently undergoing major changes in its landscape. The agriculture, and the livelihood of farmers, is changing quickly, with the introduction of new crops and adaptation to an evolving context.

¹ The provincial fund was of 12,872,340 Kips.

Box 1 : Country profile

Geography

Located in South East Asia, the Lao People's Democratic Republic (Lao PDR) is one of the world poorest countries, with a GDP of 3,4 billions US\$ (World Bank, 2007). In 2006, it had a population of 5.8 million inhabitants (World Bank, 2007), and a high ethnic diversity, especially in the mountainous areas that make up 75% of the country's area. It has the lowest population density of Mainland Southeast Asia, with 25 person/sq km (the highest being Vietnam with 254 hab/sq km, and the second lowest Myanmar 74,6 person/sq km) (Nadeau, 2006). In 2005, Lao PDR Human Development Index (HDI) ranked 130 over 177, just before the Kingdom of Cambodia (131) and the Union of Myanmar (132) (UNDP, 2008). Lao PDR borders are with the Socialist Republic of Vietnam, Myanmar and Cambodia. It has a surface area of 236 800 sq km (Chazee, 1998).

The landscape of Laos is mainly mountainous, with two-thirds of the country ranging between 200 to 2800 masl. The Mekong River dominates the hydrographical network, which flows through the country for 1865 km, and is the main contributor for many tributaries (Chazee, 1998).

Laos has a tropical, and a tropical highland climate, and a monsoon from June to September and a dry season from October to May. The seasonality of the rainfall is the major climatic limiting factor of a largely rain-fed agriculture. Actually, up to 80% of the total rainfall happens from June to September (Chazee, 1998).

Ethnicity

One of the main characteristics of the Laotian society is its multi-ethnicity, which is one of the causes of the agrarian diversity of the country. There are four linguistic groups: Môn-khmer, Tai, Miao-yao, Tibeto-Burmese, and within them, officially 68 ethnic groups (Evrard, 2006). The Tai are the major ethnic group present in Laos, as well in the plains than alongside the rivers. The Tai Lue are part of this group. The Môn-khmer is the second ranking group in population number, followed by the Miao-Yao. The Tibeto-Burmese mainly inhabit the extreme northern Laos and represent 3 to 4% of the population (Chazee, 1998).

To manage this diversity and unify the citizens, the government classifies ethnic groups into three types: Lao Loum (Lao from the lowlands, Tai, around 50% of the population), Lao Theung (Lao from the midlands, Môn-khmer, 26-36% of the population), Lao Sung (Lao from the highlands, Miao-Yao, 6-10% of the population). This representation might not be ethnologically correct, but is still widely used. For example, the three ethnic types are represented on the bank notes (1000 Kips) or at the district gates by women wearing the traditional dress of their ethnic group. They symbolize the national unity. The precise ethnic group is mainly used by social scientists, while people first tend to define themselves by their adherence to one of the three ethnic types, and then provided subdivision as ethnic group.



Figure 1: Lao PDR map (U.S. Central Intelligence Agency, 2003)

Box 2: An economy based on agriculture and natural resources

The economy of Lao PDR is mainly based on its subsistence agriculture and the export of natural resources (minerals, timber, etc.) and agricultural products (maize, etc.). The raw products are exported to the European Union (27.7%), Thailand (18.5%) and Vietnam (16.7%). The processed products are mainly imported from neighbouring countries, i.e. Thailand (58.3%), Vietnam (10.8%) and China (9.3%) (Nadeau, 2006). The principal regional investor was Thailand in 2006, Vietnam in 2007 and China in 2008 (Vientiane Times, 2008).

Lao PDR, since the opening of the country to global economy at the end of the 1980s, underwent a deep transition from subsistence agriculture to commercial agriculture. In

2006 for example, the GDP grew by 7.6% (World Bank, 2007), mainly due to foreign exploitation of valuable natural resources. Forests, hydropower, mines and industrial crops are intensively exploited, with potentially bad consequences on social, environmental and economical levels, on the long run.

In order to reduce the impact of this transition on deforestation and rural poverty in the uplands since the 1990s, the Government of Laos (GoL) has actively promoted series of regulations and policies, such as a land reform (Evrard & Mathieu, 2004), a ban on shifting cultivation (Chazee, 1998), and eradication of opium cultivation. The GoL has also promoted the resettlement of villages from the highlands to the valleys. This process has three main components: (i) to improve rural services and infrastructures, (ii) to eliminate the cultivation of poppy through an increased control over agricultural areas, and (iii) to favour the regeneration of natural forests that were traditionally managed under shifting cultivation systems (Hanssen, 2007). The GoL aims at eradicating shifting cultivation by 2010 by allocating less land to farming households than what would be necessary for a sustainable management of shifting cultivation systems (Ducourtieux, 2006, Evrard, 2004). These lands allocation and resettlement policies have turned to be very stressful for subsistence farmers who did not have any other livelihood alternatives and turned out to induce more poverty in remote areas. To mitigate this negative effect, the GoL actively promoted foreign investment in the agricultural sector as a way to intensify and diversify cropping patterns.

As the forest cover is decreasing and forest fragmentation is increasing (Evrard & Mathieu, 2004), the development of tree plantations, such as rubber or teak, is seen as a win-win solution: source of income for the rural poor people, source of income for the government as an exported commodity, and trees contributing to the afforestation scheme of GoL towards the ambitious target of 70% forest cover while the area is currently under 48%.

These crops expansion (teak, rubber and jatropha for biofuel) is fast, and their ever-growing popularity has raised some concerns. Private investors often back up cash crop promotion, providing technical knowledge and capital to farmers, in sometimes unclear settings, which can be the cause of ill-informed decision-making. As a consequence, the adoption of these new crops can be tainted with failure, and unexpected drawbacks may pave the way through the transition.

Some of the industrial crops are attractive for concession settings, like rubber for example. But tree crop plantations require important investments on the long run, which prompt investors to obtain guarantee on lands (Hanssen, 2007). Since the early 2000s, foreign investors are engaged into a race to land concessions. As a result of local agreements with officials and communities, different types of institutional and legal arrangements for access to land have emerged in a mix of foreign company owned concessions, contract farming, and smallholders. Beside land management, resettlements and people migrations could potentially have a huge impact in the future on the labour force available to work on the plantations (Evrard & Mathieu, 2004).

Following the success of the first plantations at the end of the 1990s, at this time encouraged by a strong demand from the regional and international market, rubber was seen as a miracle crop, able to transform the landscapes and livelihoods of rural Laos so as to meet all the policy targets of the GoL, i.e. to eradicate poverty, opium, and shifting cultivation. Since 2005, a rubber fever seems to have contaminated the country. First the Northern provinces were affected, and the rest of the country has yielded what has been called the *green gold*. The rubber industry has become an important sector in the Lao economy, and is spreading out of control, expanding faster than the relevant policies. Facing this overwhelming expansion, the GoL began to worry about the consequences of such an unplanned increase of plantation areas. This was an incentive for the GoL to launch a moratorium in May 2007, thus giving time to understand the dynamics of rubber plantations in the Laotian context, and their impacts. Some concessions have already caused a loss of both public and private assets, such as land and service (Dwyer, 2007). These impacts are to be balanced with the expected results, i.e. direct income for the government and benefits for the local communities.

The recent rubber boom, accompanied by a general expansion of industrial crop demand for rubber is increasing, but the prices will fluctuate, putting the whole industry at risk. Coping mechanisms need to be designed through negotiations with neighbouring countries to balance the costs and benefits among different stakeholders on the global economy.

In Lao PDR, rubber expansion is therefore emblematic of the fundamental changes in agriculture and rural development patterns that the country is undergoing. I use it in this report as an entry-point to understand the larger societal process of the agrarian transition in Lao PDR.

1.2 The rubber boom: a research challenge

This research is integrated in the CATCH-UP (Comprehensive Analysis of Trajectories of CHange in the UPlands) Program, which studies and documents the agrarian transition and its influence on deforestation patterns in Southeast Asia through a research-development oriented approach. It begins with the establishment of a baseline on land use changes and its drivers, by capturing the actual diversity of landscape and livelihood. Different aspects of the agrarian transition are being reviewed in an interdisciplinary approach in different case study sites, and incorporated into an integrated comparative framework, including landscape management, changes in livelihood systems, environmental impact, biodiversity, collective action, etc.

The CATCH-UP Program is part of the newly created Policy Research Centre (2007) of the National Agriculture and Forestry Research Institute (NAFRI). The project is developed in collaboration with the French Institut de Recherche pour le Développement (IRD) and the Center for International Forestry Research (CIFOR). The NAFRI has great ambitions, as its aim is to support the policy makers of the Ministry of

Agriculture based on this joint R&D research outputs (MAF). The rubber is therefore a good research object for the project, at is rapidly transforming the natural and human environments in rural areas.

A major challenge is to meet f k h h g t g p v " i t q w great 'expectations vinc m g j q n f g supporting policy decision and implementation. To be efficient, the research has to simplify the -complex- reality in order to grasp the interest of policy makers, while never confusing analysis and action. Generalization and oversimplification are important snags to be wary of. Doing research on rubber in Lao PDR is also challenging because of the lack of hindsight and the rapid pace of changes, which pledge for a constantly learning process and a highly adaptive approach of the rubber-related institutional dynamics.

This study was designed to provide relevant knowledge for decision-making. There is a rising concern about rubber development, which is considered too fast to take all the aspects involved in a policy framework into consideration. The moratorium on land concession showed by evidence that more complete information on the situation on the ground is needed by policy makers, while the rubber expansion continues to feed the public debate. The policy dialogue must go on, and hopefully the result of this study will contribute to improve the adequacy of the policies to the transforming landscapes and livelihoods.

To explain the dynamics of rubber plantations, and broaden the results to a comparative framework, two theories will be used.

The concept of regime

The first theory is founded on the concept of regime, which is based on cooperation between states. As defined by Le Prestre (Le Prestre, 2002) . " *regim* is generally understood as a set of interrelated norms, rules and procedures that structure the behaviour and relations of international actors so as to reduce the uncertainties that they h c e g " c p f " h c e k n k v c v g " v j g " r w t u w k This definition " e q o o q p ' is particularly interesting in this context, firstly because of the various level of actors, and secondly because of the multiple localizations of rubber arrangement. One of the strengths of this concept is its versatility. Each regime is characterized by its own dynamics, which result from a specific arrangement of interest, knowledge, and power (Smouts, 2008). The regime concept is by definition structured with the norms of behaviour expected from its actors: decisions are not independent anymore, but depend on an arrangement between actors of the issue.

There are several approaches of the t g i k origins depending of the key actors of the arrangement: the realist, rational choices and the constructivist approaches. Two of them are relevant in this context.

- The realist approach concerns a state-centered view, in which the most powerful actors are imposing their interest and thus determining the modalities of the regime (Smouts, 2008). Even if in this case, it is arguable to say that the state of

the Lao PDR is the only state involved, as other powerful actors include other states as the neighbouring state of China, Vietnam. But this realist approach is not the only one that can apply to this situation. The rubber plantations are in evolution, and if the realist approach was appropriate at the beginning of the expansion, the increase of rubber importance in the Laotian society has changed the socio-economic conditions and another approach is now emerging.

- The constructivist approach is then particularly fitted to the situation since it includes the non-state actors, with emphasis on perception, communication and knowledge (Smouts, 2008).
- The third approach, the rational choice is not adapted in this case, as it presupposes a win-win situation where all the actors are cooperating to resolve an interests on a rational basis, towards a common good, satisfactory for everybody (Smouts, 2008). The problem here is that the actors are not aware of their positioning in the situation, and most of all are not identifying their problems clearly, negating sometimes their existence.

The negotiations

The origin of regimes, as seen earlier, can be connected to another main theory used in this research: the theory of negotiation, which is a building part of the processes of expansion. The apparition of regimes is linked to the result of a negotiation, as well as the

In relation to the realist approach of origin of the regime previously discussed, the theory of negotiation offers an interesting perspective on the importance of power in the process. The balance of power between the actors is the major element that will influence all the process, firstly by determining the context of the negotiation and then the strategy of all the actors participating or not.

With regards to the review of literature and the structuring concepts, preliminary hypotheses were drawn. They were used as a basis for a semi-structured interview guide (Annex 2) and the site selection for the field work.

2 Methodology

2.1 The successive stages in the research process

The meta-scientific position of the research is based on a combination of k p v g t r t g v k x k u o . " y k x g " o g g p g p i and positivism. These two approaches can be seen as complementary. Positivism thinks that all phenomenon present repetitive patterns, in the natural world as in the social world.

Interpretivism, on the other hand, sees the world as a complex pattern, where different realities can co-exist. So, to understand one part of it, it is the whole which has to be examined (Mikkelsen B., 1995).

These two research positions have a consequence on the study design: a mix of descriptive and interpretative study. The aim is first to describe the expansion of rubber, to understand the dynamics behind it, and then to generalise the result to a wider phenomenon: the agrarian transition in Laos.

On another level, the study was influenced by the particular context in Laos, where development agencies play an important role, often linked to research. In this context, paradigm presented by the anthropologist Olivier de Sardan (Olivier de Sardan, 1995), as the Modernist paradigm, where development involves technical and economical progress, and the Altruistic paradigm, which is the basic belief that development aims at the well-being of the population, have to be taken into consideration.

The research was clearly an iterative process. It began by a literature review, following which hypotheses were built, and assumptions made. Interviewees were asked to react to these hypotheses, and their opinions influenced the location study and helped in detailing the hypothesis.

The analytical aim of the study relies in part on the comparative framework which integrates all the location studies. This framework, needed to compare multiple locations with a unique combination of constraints and therefore strategies, has to be flexible enough to allow such a comparison, but sensible as well to ensure any reliable analysis. One keystone of the framework is the concept used in the study. First, a general angle had to be adopted. In this case, livelihood was the key concept used, and more precisely, the sustainable livelihood framework.

This framework is particularly interesting for two points. First, it has a holistic view of the different dynamics, and thus is great for interdisciplinary research, especially in a multiple actors and levels context. Secondly, it can be used as a common ground for several types of interlocutors, policy-makers, researchers or development agencies. Based on more than a concept, it is a notion. The term of livelihood has a lot of definition and takes into consideration a wide scope of elements.

< Literature review:

The first step of the study was a review of literature on the rubber in Lao PDR, and South East Asia.

The literature can be classified in 3 categories. First, there were all the references about rubber in Northern Laos, concentrating on rubber socio-economic study. The second part talked about land-use change and landscape transition, with reference to ecology. The last category is the economy of the rubber commodity and rubber plantations. The main model studied is the smallholder regime, throughout Asia (Indonesia, Thailand, and India).

In Laos, where several types of plantation exist, the most studied ones are smallholders, and to a lesser extent, contract farming. This situation is the result of the concentration of research in Northern Laos, especially in Luang Namtha Province. Even though this choice is logical as this province is the center of the recent rubber boom, the particular conditions of rubber development in the Northern provinces prevent its generalisation countrywide. Driving forces of plantation have been documented, the most important factors that have been identified- and which justify the success of rubber plantation are the ethnic and family kinship networks. Cross border influence is one of the main characteristics of rubber fast development in Northern Laos.

One of the elements that weren't well developed is the relationship between the different ways of growing rubber, and their links within each location, as well as the social networks between villagers adopting rubber cultivation.

◁ Hypotheses

With regard to this review of literature, preliminary hypotheses were drawn. They were used as a basis for a semi-structured interview guide and the site selection for the field work. In fact, these hypotheses had to be tested through the fieldwork, and were to be consistent with the set of hypotheses defined here.

1. Cross border influence of neighbouring countries, i.e. Thailand, China, Vietnam, in the regional pathways of change.

The first hypothesis to be tested was the existence of a distinct Chinese and Thai influence linked to different rubber arrangements (this would later on lead to the concept of rubber regimes). The situation was quite documented for the North and the special links with China.

2. Various rubber regimes emerged according to differentiated management of land, labour, capital, market and technical expertise.

V j g " u g e q p f " j { r q v j g u k u " y c u " v j c v " v j g t g " y g t g " associated with distinct networks of diffusion and investment (smallholder, contract farming and concession).

3. The complex process of innovation largely differs from place to place as it relies to a large extent on local social networks, leadership and institutional frameworks.

The third hypothesis relates to multi-scale innovation. It is the existence of transnational and external effects of the industry.

A combination of methods was used, both qualitative and quantitative. The quantitative data were mostly used in a descriptive perspective, in order to condense the data; at the contrary of the qualitative data, mostly used to highlight the details of particular results.

< Key informants interviews, semi-structured questionnaire

A flexible, semi-structured, questionnaire was prepared, to test the hypotheses with the interviewees. The main objective was to systematize the data collection, while preserving

The guidelines were divided in four parts. The first one was the history of expansion of rubber. The second one was the social networks around the rubber development. The third one was the land management, and the last one concerned the technical aspects of rubber cultivation.

The interviewees were divided in two categories. The first group was made of specialists working with development projects in a foreign governmental agency, in collaboration with the Laotian government. They were involved in several kinds of projects; either with government officials, from the district level to the provincial one. They were working in PAFO, DAFO, Provincial DPI and Land Authority.

< Selection of study sites

Based on the literature review and key informant interviews, study sites were selected. During the review of literature and the interviews, a high diversity of situation was found. Consequently, each selected location presented a particular situation that had to be described. Moreover, it was important to have a countrywide distribution of the sites. They were chosen in the North, Center and South of Laos.

< Adapt questionnaires and methods to the specificities of each site

The questionnaire was adapted to a wide range of cases because of its structure in two parts. The first part was general, focussing on demography and livelihood, production systems including rubber, and perception of landscape changes. The second part depended on the type of respondents: rubber cultivators, other cultivators or workers in a concession. After the first field survey, knowledge gaps and incoherencies were detected and corrected for the following fieldwork. The questionnaire can be found at the annexe 2.

Each field survey, with its specificities, benefited of special consideration in the survey process; some at the questionnaire level (the concession worker was only encountered in the last field, by example), or at the interviews level.

The questionnaire was developed in collaboration with all the members of the team, and especially with Bounthanom Bouahom. The field survey was done in collaboration with her.

< Sampling

The questionnaire, due to its adaptability, was most usefully addressed to several categories of respondents, in each location. For this reason, the sampling technique adopted was the stratified sampling. They were three variables used to define the strata: rubber cultivation (presence/absence), wealth of the household (poor, average, and superior) and age of the head of household (inferior to 30 years old, between 31 and 48, and superior to 49).

2.2 Data collection at multiple scales

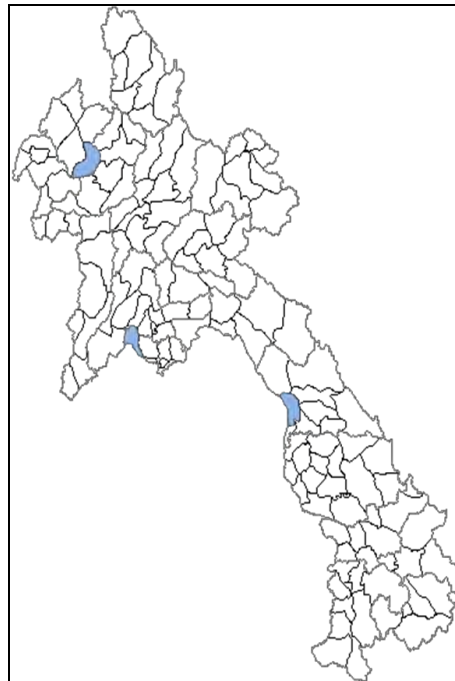


Figure 2: Study location

Due to the multiple-level study, the data were collected at three complementary scales, ranging from local households to higher administrative levels.

At the local level, the reference unit was the household, with the head of household as a target, completed with the village authority.

2.2.1 Localisation of the study sites

There were seven villages in 3 provinces (Vientiane Municipality, Luang Namtha, Khammouane), and within them, three Districts (Sangthong, Nalae, Thakek)).

Khammouane province

Khammouane Province in the Southern Laos, is presently investing in rubber production. Thakek District has an area of 90,000 Ha. There are 89 villages. There are 84 331 inhabitants, among which 43 338 are females.

Ban Nakoum is a village of 468 inhabitants (324 females) (DAFO Thakek, 2007). It has the particularity to have two concessions inside its boundaries, one for rubber with the Lao Thai Hua Rubber Company and one for eucalyptus with the KIE Company, established in 2001-2002.

The village was established more than 300 years ago. Before 1975, the number of households was estimated to 50. Before the road access, which was completed in 1996, 30 households moved to Ban Nasaard in 1993, where the school was moved a few years after.

Table 1: Land use in Ban Nakhoum

| Land use | Area (ha) |
|----------------------------|-----------|
| Army land | 261.5 |
| Migration land | 131 |
| Conservation forest | 30 |
| Regeneration forest | 104 |
| Protection forest | 80.5 |
| Using forest | 207.5 |
| Sacred forest ² | 3.5 |
| Agricultural land | 322.67 |
| Total | 1 140.67 |

Source: Land allocation map, Ban Nakhoum

The main cultivation is paddy rice, with some farmers cultivating banana, and a few cassava.

The second village, Ban Khamboun, was chosen in collaboration with the company, as it was a village where the company was present under the contract farming scheme, with the presence of smallholders and some concession workers.

2 There are two kinds of sacred forest, one for the dead and the other one for the spirits

Ban Khamboun is one of the biggest villages of our study. According to the DAFO (DAFO Thakek, 2007), it has a population of 277 (137 females). However, the head of village gave the figure of 794 inhabitants, among which 421 females³. The land allocation process happened in 1995-1996.

The main cash crop is banana, with few farmers cultivating cassava and vegetables. The village was established in 1910, when about twenty households moved from their former village in the same province to ward off the fate of a stomach-ache epidemic. In 1975, soldiers began to arrive in the village, to finally establish a garrison in 1975. Soldiers often wed in the village and stayed there after their demobilization.

We have two different land use figures for Ban Khamboun. Depending on the source, the differences can be quite dramatic. There is an official source, which is the land allocation map at the entrance of the village. The figures given by the 2nd headman of the village are very different. However, even if some of the differences can be explained by a time factor, the wide decrease of village land is strange.

Table 2: Land-use in Ban Khamboun

| Land use | Area (ha) |
|-----------------------|-----------|
| Building area | 8.4 |
| Paddy field | 193.89 |
| Garden | 236.44 |
| Agricultural land | 368.25 |
| Rubber concession | 82 |
| Bio diesel concession | 21 |
| Total | 807,04 |

Source: 2nd head of village, Ban Khamboun

Table 3: Land-use in Ban Khamboun

| Land use | Area |
|----------------------------|---------------------------------|
| Paddy field | 114.44 |
| Regeneration forest | 675 |
| Using forest | 635 |
| Sacred forest ⁴ | 52 |
| Plantation | 22 |
| Protection forest | 421 |
| N/A | 17 |
| Total | 2050.88 (1936.44 ⁵) |

Source: Land allocation map, Ban Khamboun

3 This disparity might be due to the existence of two sectors in the village: one new, near the road, and one older, slightly more remote

4 Two kinds of sacred forests

5 Numerical total, as opposed as the official total of the map

Luang Namtha Province

Nalae district has an area of 162,400 ha, and is mountainous at 98%. The population is of 22,264 inhabitants, in 72 villages. This district is the poorest in Luang Namtha.

Table 4: Land use in Nalae district, 2007

| Land Use | Area (ha) |
|------------------------|-----------|
| Rainfed lowland rice | 390 |
| Irrigated lowland rice | 77 |
| Upland rice | 2,500 |
| Forest | 67,019 |
| Other | 92,414 |
| Total | 162,400 |

Source: DAFO Nalae (2007)

Three villages had previously been chosen for the fieldwork, based on literature review: Ban Phavi, Ban Vad, and Ban Phouvieng. Each of them presents particularities interesting for the study.

Ban Phouvieng was the first village to plant rubber in Nalae district, in 2004. This was an initiative of the District which, in collaboration with the Agriculture Promotion Bank, offered a special credit to farmers interested to plant rubber, with an interest rate of 2% per year, to be reimbursed within 10 years. It is a Khamu village, with a population of 123 inhab., of which 56 are female. Neither the village area nor the exact area for each land use is known because an important conflict followed the land allocation process, the land use data were neither available in the village nor at the DAFO.

Ban Phavi is a village where a first rubber company, the Xia Ma Company began its operations in 2005. Following administrative problems (lack of support by the DAFO), this company stopped working in late 2005. In 2006, the Jia Xuang Company began to promote rubber plantation, jointly with the DAFO. The ethnicity of the village is Tai Lue. The population is 196 inhabitants, of which 122 are female. The total area is 484 ha.

Table 5: Land use in Ban Phavi, 2003

| Land use | Area |
|-------------------|------|
| Agricultural land | 376 |
| Production forest | 20 |
| Protection forest | 37 |
| Fallow | 42 |
| Sacred forest | 1.5 |
| Paddy fields | 5 |
| Residential area | 2.5 |
| Total | 484 |

Source: Land allocation map, Ban Phavi

Ban Vad is another village where the Xia Ma Company started operating in 2006. It was not part of the first 25 villages allocated to the company by the district. However, after having learned about the arrival of the company in the neighbouring village of Ban Hadte, the Head of village of Ban Vad asked the DAFO for the official permission to invite the company to work in the village. As the company had not yet reached its goal with the 25 first villages, an extension was allowed, and the company was able to work in Ban Vad, even though the village didn't have road access yet.

It's a Tai Lue village, with a population of 223, of which 107 are female. The total area is 675 ha. This village was studied prior to the introduction of rubber, and the comparison of livelihood and agriculture before and after the rubber is part of the objectives of the study.

Table 6: Land use in Ban Vad, 2001

| Land use | Area (ha) |
|---------------------|-----------|
| Agricultural land | 306 |
| Conservation forest | 28 |
| Protection forest | 68 |
| Using forest | 61 |
| Sacred forest | 3 |
| Village area | 205 |
| Residential area | 4 |
| Total | 675 |

Source: Land allocation map, Ban Vad

Vientiane Municipality

In the center of Laos, Vientiane Municipality is a province center on the capital city of Lao RDP: Vientiane. The district of Sangthong, alongside the Mekong River, is at the border with Thailand. There are 26.035 inhabitants (on which 12.843 female) with 19.000 households (DAFO Sangthong, 2008).

Several projects were carried out in Sangthong district, principally by the GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) and the Faculty of Forestry (National University of Laos) (Bouahom & al., 2004, Thapa, 1998). Industrial plantation (mainly teak *Tectona grandis*, agarwood *-Aquilarias*, fruit and industrial tree were promoted). The industry is promoting maize cultivation, as well as cassava. The Ministry of agriculture has an ongoing study on organic rice. There is a Chinese rubber company, from Yunnan, just starting its promotion.

Table 7: Land use in Sangthong district

| Land use | Area (ha) |
|-------------------------|------------------|
| Land agriculture | 38.673 |
| Forest | 41.117 |
| Rubber plantation areas | 130 ⁶ |
| Total areas | 80.000 |

Source: DAFO Sangthong (2008)

Land allocation is not finalized; there is no land title in Sangthong, but temporary right certificate, which land is checked every year by the DAFO for validating its utilization.

Table 8: Demography data of Ban Nasa and Ban Nasaonang

| Ban Nasa | Ban Nasaonang |
|------------------------------|------------------------------|
| 947 Inhabitants (485 female) | 404 Inhabitants (203 female) |
| 204 households | 82 households |

Source: DAFO Sangthong (2008)

Two villages were selected in Sangthong District: Ban Nasa and Ban Nasaonang. Ban Nasa is home to the first rubber plantation of the district, planted in 1997. Links with Thailand are narrow, as there is an important kinship network across the border. The villagers defined themselves as Lao Loum. The village was founded last century.

⁶ Of which 2,5 ha are mature.

The second village, Ban Nasaonang, has started rubber cultivation much recently, in 2007. Teak plantations are important in this village, and constitute an attractive alternative to rubber. This village, founded during the seventies, and an important immigrant wave of khamu from Phongsaly.

Table 9: Ban Nasaonang Land use

| Land use | Area (ha) |
|-------------------|------------------|
| Paddy field | 195 |
| Grazing areas | 106 |
| Rubber plantation | 34 |
| Production forest | 30 |
| Garden | 28 |
| Teak plantation | 22 |
| Sacred | 2,5 |

Source: Land allocation map, Ban Nasaonang

At the higher levels, there was first the district, and then the province authorities. This level was mainly processed through interviews of key respondents.

2.3 Data analysis and interpretation

◁ Management of qualitative and quantitative data

Two approaches were alternatively used in the analysis: the inductive and deductive approaches. First, a primary analysis was performed when the hypothesis were developed using secondary data. The review of literature was based on an array of locations and situations representative of the diversity and complexity of the situation.

Once hypothesis were drawn, and results collected, a deductive approach was used to test these results with the hypotheses, and so to try to put the different case studies in a general analysis.

The qualitative data were analysed first by using an analysis similar to the coding analysis: organising data into conceptual categories, and then analysing them with concept or themes adapted. This approach relies heavily on the recognition of patterns, and requires having more knowledge about the situation than only raw data. In this case, the review of literature provides the background information. It is quite adapted to the system analysis (Mikkelsen B., 1995).

However, the coding analysis is based on the grounded theory, which requires a different study design, beginning with encoding the data in categories, generating concept and then only put forward a hypothesis (Glaser/Strauss). This is not the case of the study, where

the theoretical framework was found first and key concepts defined before the analysis. But the hypotheses were built after the review of literature.

The interviews were also analysed using matrix display, which was a good way to have an overview of all the information given by the informants, in different ways such as the important quotes, summaries of position, or potential explanation. A database was developed to enter all the data collected. Some data had to be estimated due to knowledge gaps (for example, the area in hectares was not always known for upland rice and maize, a calculation had to be done with the amount of planted seeds). Some information y g t g p ø v " m p q y pSome informal data were written downUnder the form of networks, first on the field, and were updated after the review of all the information collected.

< Statistical analyses:

Quantitative data were analysed with descriptive statistics: percentage, frequency, and square chi test. There was not a sufficiently high number of respondents in each location (the range was 9 to 15), in order to do test hypotheses and so on. The statistics were mainly use as a support to the qualitative analysis.

< Reliability

A good reliability and validity was an important aim for the research. To achieve it, first, the triangulation of methods was used to identify any potential incoherencies or contradictions that needed clarification.

One of the main constraints was the difficulty to obtain figures. Some information, on the concession in particular, was difficult to obtain. The steps to obtain a concession were quite complex, with a lot of different actors, and the informality of some actions made it difficult to find written data. Another constraint was the language. Not all the study team members were Lao native speakers, or even Lao speakers.

A potential bias could be induced by the sampling. Although it was not a convenience sampling, some selected respondents could not be interviewed, either because of physical unavailability, or disagreement of the village chief.

3. Results

3.1 The regional process of rubber expansion

3.1.1. The extent of the process of rubber expansion

Spatial point of view is one of the different approaches for understanding the rubber expansion in Laos. Space, in this case, should not be understood only in a physical meaning, but more as a process combined with time analysis.

The social spatiality can be split according to several modes or perspectives, with regards to globalization, territoriality and mobility (Bærenholdt & Simonsen, 2004). These approaches will be used throughout the research, to illustrate and link causes to effects.

The space of flows (Castells, 1996) represents a spatial network that connects actors, commodities, technology and information with flows⁷. The bases of networks are explained hereafter, and will be developed with the description of the rubber regimes and the rubber innovations.

Box 3: Mobility

It is defined by Bærenholdt and Aarsæther (2004) as "the ability of actors to move between specific spatial forms, and thus can be mobile or territorial."
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The space of boundaries is established by the relationship between globalisation and territoriality. This connection, or interaction, between space and people leads to see the territories not as closed through boundaries, but with a porosity that might lead to a transcendence of its boundaries⁸. Mobility is an important component for this transcendence, and participates significantly to the rubber expansion.

3.1.1.1 Three main zones of influence

There are three geographical areas of influence in the rubber industry, each linked with Northern Laos, Vietnam and Thailand. Each of these countries has a

⁷ The space of flows is defined as a network of flows between actors

⁸ These interactions between borders are quite important in rubber production in Northern Laos and have been studied in detail by Antonella (2008) and Shi (2008).

different approach to rubber cultivation, and it has influence on rubber plantations in Laos.

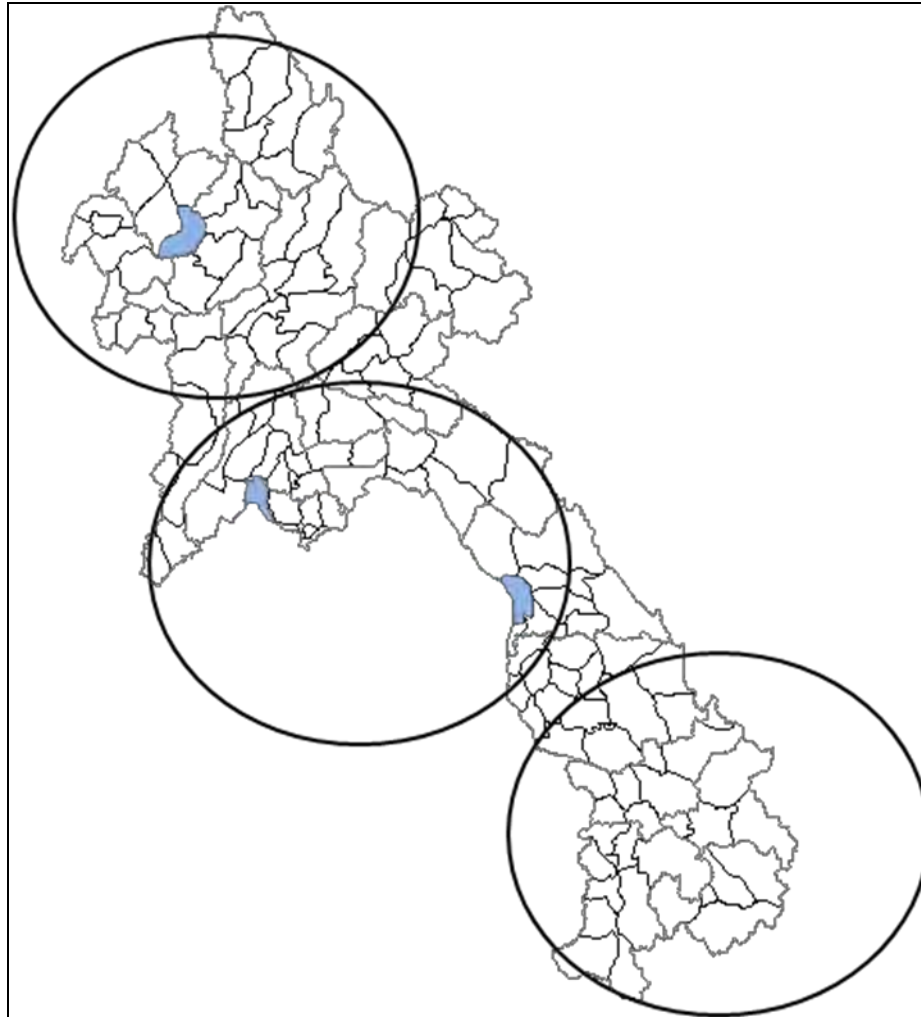


Figure 3: Zone of rubber influence

The interaction is first of all due to transboundary relationships, such as kinship or commercial linkage due to ethnical facilities. Neighbouring countries like China and Thailand have been growing rubber for several years, and their plantations are currently in production.

First of all, the exposure of Lao farmers to a new crop, and thus to a modified livelihood prepares to an openness to other crops than those traditionally cultivated in Laos. In a regional perspective, the agrarian transition is at different stages, the most advanced and more aggressive being China.

a. China

The introduction of rubber in Laos is linked with its cultivation in China. At first, the plantation in Luang Namtha related to the districts of Sing and Long. The main driver at that time was the kinship network. Following the advice from relatives or members of the same ethnic groups—in this instance the Hmong ethnic groups, farmers began to adopt rubber. The members of networks established across the borders, especially the Chinese borders, favoured their relatives over the distribution of technical knowledge, access to capital and inputs (Antonella, 2006). This particular location can be explained principally by sociological and economical reasons, such as the close ties between the farmers across the border to China, and the exceptional economic boom of China and Laos.

So even if, historically, the plantations began in southern Laos, the real beginning was in northern Laos, precisely, in Luang Namtha Province.

The most influential neighbour of Laos, through political and economic ties, China is one of the most important producers and consumers of rubber. China is in need of rubber to support its industrialization (its growth is in the range of 10-12% per year) (Nadeau, 2006). For example, transport is one of the developing sectors, and as such, tires for trucks, planes and cars are needed. For the government, rubber is an essential product to

From the cultivation in collective farms, the production shifted to smallholders. New

The Xishuangbanna Province is principally inhabited by uplands minority people: Dai, Akha, and Lanu. The traditional landscape was based on a composite swidden land use, with swidden fallow fields, fish pond, homegarden, some cash crops and eventually paddy rice fields.

The cultivation of rubber in the Xishuangbanna Province is quite controversial, as it is one with the highest biodiversity: 0.2% of the Chinese land area represents 25% of the biodiversity (Jianchu, 2006, Li & al., 2007). From 1988 to 2003, the rubber area has increased of 324% (Liu & al., 2006). Socio-economic changes are important, most notably in the economics structure: an increase in agricultural production (due to rubber plantations), and an increase in the industry (from processing latex) (Jianchu, 2006, Jianchu & al., 2005).

Since the beginning of the rubber plantation, the landscape transformation is quite impressive, adding ecological concerns for the situation in Laos. The biodiversity was high, and maintained by traditional agricultural practice such as protection of species of interest in the swidden cultivation fields, combination of annual and perennial crop. But the government had negative views of the swidden cultivation, since this practice was considered destructive, backward and associated with a low productivity. Hence policies of eradicating it in favour of annual and perennial crop like rubber were developed.

The Chinese rubber sector is currently in stagnation, due to the lack of suitable land, an already high productivity and the effect of the consequences of a typhoon in the rubber producing Hunai Province, in 2005 (Shi, 2008). The main limiting factor is the lack of land suitable for rubber cultivation. Since the beginning, all the appropriate land has been used. Firstly, there is a land scarcity, because of price and land fertility. Secondly, China is at the northern limit of rubber cultivation range (Vongkhamor & al., 2007).

The rubber consumption of China was in 2007 of 2.6 millions of tons, *i.e.* the double of the consumption in 2001⁹. In comparison, the domestic production was in 2007 of 577,000 tons (IRSG, 2008). To ensure a constant supply, in spite of having achieved a domestic production ceiling, China has developed since 2004 a strategy to promote rubber plantation in the neighbouring countries. The opium replacement strategy was aimed to help Myanmar and the Northern Laos. It is primarily based on subsidies accorded to private companies operating abroad, by example to replace shifting cultivation with rubber plantation.

b. Thailand

In the western part of Laos, both in the center and the south, a strong interaction with Thailand is noticeable. This interaction with Thailand has been noticed in two of our study locations (Vientiane Municipality and Khamouane Province).

Rubber was introduced in Thailand at the beginning of the 20th century, and there was an area of 2, 29 million ha of rubber plantation in 2006 (Thai Rubber Association, 2008). There is a strong history of rubber smallholders, which was heavily promoted by the government, under the Rubber Estate Organization (REO), which finance the ORRAF (Office of Rubber Replanting Aid Fund). An estimate of 95% of smallholders, opposed to 5% of rubber estate has been provided by the Thai Rubber Association in 2008.

Table 10: Rubber plantation in Thailand (Thai Rubber Association, 2008).

| | Area | Percentage |
|-------------------|-------------|-------------------|
| South | 1,750,000 | 75% |
| Center | 263,153 | 11.5% |
| North East | 246,000 | 11% |
| North | 31,707 | 1.5% |

Source: Thai Rubber Association (2008)

Currently, Thailand is the largest rubber producer with an estimation of more than 3 million tons in 2007 (Rubber Research Institute of Thailand, 2008). In 2007, 12% of the production was consumed in the country, and 88% exported. Thai production is principally exported to China, which totalized 827,369 tons of latex *i.e.* 30.6% of the total volume of exportation. The others exporters are Malaysia, with 15.2%, Japan with 15% and the USA with 8% (Thai Rubber Institute, 2008).

⁹ In 2001, China consumption was of 1,330,000 tons. See annex 3 for more details.

The transformation of rubber is principally done in the South. Most of the process is done by community level rubber cooperative, a shift from the previously large scale industry. In 2007, the latex was transformed in Standard Thai Rubber (STR) for 40% and Ribbed Smoked Sheets for 31% (Thai Rubber Institute, 2008).

The experimental plantation of rubber in the North began in 1982, but the boom really took off in 1995, with the green Issan, a program aimed at promoting the development of rubber plantation in the North-East. It was specifically targeting the smallholders, providing them with financing help (plants and inputs were financed at the beginning).

Box 4: From a Thai expertise to the rubber leadership: the case of Mr Xieng

For the villagers of Ban Nasa, Thailand is just across the Mekong. Ties are strong with the Thai side of the river, and villagers used to cross the water without any problem. They received advice, a young farmer, Mr Xieng, tried to persuade his parents to start a rubber plantation. Considering their ignorance, Mr Xieng went to Thailand to learn first-hand information about rubber management.

Over the next 5 years, Mr Xieng replaced the traditional shifting cultivation with rubber trees.

Mr Xieng gradually increased the size of his plantation in 2000 and 2005. When the trees became bigger and started to produce, it inspired several villagers to start their own plantations.

A rubber group was formed to provide information and credit. The farmers could find Thai books on rubber management, and asked Mr Xieng for his rubber knowledge.

Thailand is now experiencing environmental problems because of its rubber production. Water and air pollution are the main issues. Water pollution is caused by the waste water in the rubber processing, for example by the use of formic acid. Particles of dried latex can also be found in the waste water. Meanwhile, due to the use of wood energy, smoke particles are the main aerial problem. The major type of wood used is the rubber wood. However, the environmental problems vary according to the type of rubber processed.

c. Vietnam

The Eastern neighbour of Laos, Vietnam is another important player in the regional rubber industry.

The country has doubled its productive capability between 2001 and 2007¹⁰. The rubber plantations in Vietnam are mainly concentrated in the South-East of the country and the highlands¹¹ (Barney, 2005).

¹⁰ The latex production in 2001 was of 312 600 tons, and increased in 2007 to 608, 000 tons (IRSG, 2008).

X k g v p i n f l u e n c e i n L a o s i s e s s e n t i a l l y e c o n o m i c a l a n d p o l i t i c a l . V i e t n a m e s e c o m p a n i e s i n v e s t m a i n l y i n c o n c e s s i o n s c h e m e , a n d t h e r e f o r e h a v e l i t t l e i n t e r a c t i o n w i t h t h e l o c a l v i l l a g e r s . T h e s e c o n c e s s i o n s f u n c t i o n a s a c l o s e d b o x w h e r e i n t e r a c t i o n s a r e p r i n c i p a l l y m a d e w i t h t h e i n v e s t o r c o u n t r y . T r a n s f e r s o f t e c h n o l o g y a r e m i n i m a l .

I t i s d i f f i c u l t t o i n v e s t i g a t e t h e s e c o m p a n i e s , w h i c h a r e n o t o p e n t o p u b l i c s c r u t i n y , a n d e v e n l e s s t o r e s e a r c h e r s . T h e m o s t w e l l - k n o w n c o m p a n y i s t h e D a k L a k , w h i c h a s o f O c t o b e r 2 0 0 6 h a s p l a n t e d 3 2 0 0 h a .

d. Other influences

O t h e r c o u n t r i e s i n S o u t h - E a s t A s i a a r e q u i t e i m p o r t a n t i n t h e r u b b e r i n d u s t r y , b u t d o n o t h a v e s i g n i f i c a n t l i n k s w i t h L a o r u b b e r p r o d u c t i o n . F o r i n s t a n c e , I n d o n e s i a i s o n e o f t h e o l d e s t r u b b e r p r o d u c e r s i n S o u t h E a s t A s i a , a n d t h e s e c o n d l a r g e s t p r o d u c e r , b e f o r e M a l a y s i a . I n 2 0 0 7 , I n d o n e s i a p r o d u c e d 2 , 7 9 1 , 0 0 0 t o n s o f l a t e x (I R S G , 2 0 0 8) . I t i s k n o w n f o r i t s p a r t i c u l a r a g r o - f o r e s t r y s c h e m e , l i k e t h e j u n g l e r u b b e r . T h e m a i n s y s t e m o f p r o d u c t i o n i s m a d e b y s m a l l h o l d e r s , w h i c h r e p r e s e n t s 7 3 % (P e n o t , 2 0 0 1) .

C p q v j g t " o c k p " u { u v g o " q h " r t q f w e v k q p " k u " v j g " ð p r u b b e r e s t a t e i s h i g h e r . T h e s e e s t a t e s a r e s h i f t i n g f r o m r u b b e r c u l t i v a t i o n t o p a l m o i l p l a n t a t i o n (P e n o t , 2 0 0 1) .

3.1.1.2 Description of the rubber plantation state

T h e s t a t e o f r u b b e r c u l t i v a t i o n i n L a o s i s n o t e a s y t o e s t i m a t e . F i g u r e s v a r y b r o a d l y f r o m q p g " u q w t e g " v q " c p q v j g t 0 " K p " 4 2 2 7 . " C n v q p " g v " c r r n g v j q t c " q h " p g y u r c r g t " c t v k e n g u " q p " v j g " u w d l g e n o t c o h e r e n t w i t h t h e f i g u r e s p r e s e n t e d i n t h e t a b l e 1 0 .

C u r r e n t l y , m o s t o f t h e r u b b e r p l a n t a t i o n s a r e b e i n g p l a n t e d i n t h e N o r t h e r n P r o v i n c e . B y t h e e n d o f 2 0 0 6 , t h e p r o v i n c e o f L u a n g N a m t h a h a d 1 2 , 5 8 5 h a o f r u b b e r p l a n t a t i o n s , o f w h i c h 1 1 , 1 1 9 h a d b e e n p l a n t e d b y i n d i v i d u a l f a r m e r s , a g a i n s t 1 , 4 6 6 h a p l a n t e d b y c o n c e s s i o n o r b y c o n t r a c t f a r m e r s (S h i , 2 0 0 8) .

¹¹ Jaakko Pöyry (2001) estimate rubber in Vietnam 5,000 ha in North Central, 164 000 ha in the Highlands, and 243 000 ha in the South East, for a rubber plantation total of 412, 000 ha. However, in 2000, the FAO (FAO, 2000), estimated the rubber plantations to be up to 299,000 ha, for a percentage of 17.5 % of all industrial tree plantations.

Table 11: Area planted in rubber in Lao PDR

| Regions | Area (ha) | | |
|----------|-----------|---------|----------------|
| | 2006 | 2007 | Target in 2010 |
| Northern | 7,341 | 16,547 | 121,000 |
| Central | 1,636 | 2,846 | 10,000 |
| Southern | 2,801 | 8,737.8 | 52,840 |
| Total | 11,778 | 28,131 | 183,840 |

Source: based on (Forestry Research Center, 2007)

The official figures of rubber plantation are not quite up to date, as the area actually occupied by rubber concession is changing fast and might not be equal to the real area given into concession. In February of 2007, the Committee for Planning and Investment estimated the total area given to rubber concession to be up to 200 000 ha, for 17 companies (Dwyer, 2007).

3.1.1.3 Spatial organization of rubber plantation

The rubber plantations have a specific spatial organization which is coherent at all levels. As seen previously, the plantations are mostly spread in the north of the country, where the expansion began.

a. At the province level

From a review of the situation at the provincial level, by comparing the expansion of rubber in each district, it appears that some of the studied locations have encouraged a process of plantation.

In Luang Namtha, the first district to where rubber was planted the Nam Tha district (Alton & al., 2005). The following districts were Sing and Long, which are located on the north of the province, at the border with China.

The conditions in Khamouane province are similar to Luang Namtha. Specific circumstances lead to the establishment of rubber plantation in Hinboun and Thakhet district in the nineties. However, the following generation of plantations had to wait for the support of companies óspecifically financial and technical.

In Vientiane Municipality, the situation differs and is difficult to extrapolate at a province level because of the importance of the city of Vientiane, particularly at the socio-economical level.

b. At the district level

In Sangthong District, the rubber plantation was implemented in three waves. The first one began by the plantation in 1997 of a forerunner, in the village of Ban Nasa. Mr Xieng had been working in rubber plantations of relatives in Thailand, who convinced him to plant them once back in Laos. The result of this plantation convinced the first generation of farmers to invest in this new crop. A rubber group was constituted in 2005, which favoured the coming of the second generation of farmers. The spreading of know-how was then structured through the rubber group. Finally, the third generation was more comprehensive and included poorer farmers, who adapted some of their land to rubber cultivation.

In Nalae District, the plantations are distributed in villages alongside the Nam Tha River, and are accessible as well by the road. Since the beginning of the company, in 2006, the center of the expansion is the district town. The river is still an important way of communication. In Ban Vad, the new rubber plants were delivered by boat, as limited access by the road then unfinished was possible.

In Thakek District, the development is more anarchic. Even if the vicinity of Thailand influences the plantations, the oldest ones are not near the river. Around the concession of the Lao Thai Hua Rubber Company, contract farming, in association with this business is currently being developed.

c. At the village level

At the village level, two kinds of villages can be identified, the discriminating factor being the type of rice production. However, there is one point in common: the road access is primordial, and plays an important role in the implementation of rubber culture. This is one of the main constraints to the development of the rubber industry. Rubber plantations are established in remote villages, which is a limiting factor to both the distribution of the product and its marketing. Rubber farmers are now asking for road construction. As an example, Ban Had Nyao farmers have recently asked the provincial Deputy Governor Phanthong Phitthoumma, to build roads to transport rubber (Vientiane Times, 2008).

The figure 3 presents a simplified organization of two rubber villages, based on the PRA mapping of the villages¹², and on physical observation. The type of the village with upland rice is typical of Luang Namtha Province, and in this study, is illustrated by the villages of Ban Khamboun, Ban Vad and Ban Phavi. On the other hand, the case of the village with paddy rice is more an illustration of the situation in Sangthong district. Paddy rice fields are installed near the village for an easy access.

¹² See annexe 4.

The rubber is most often located near the residential areas, to facilitate the access. Other important factors to the decision of the location are the closeness of the paddy fields and the necessity to fence the plots to protect them against livestock.

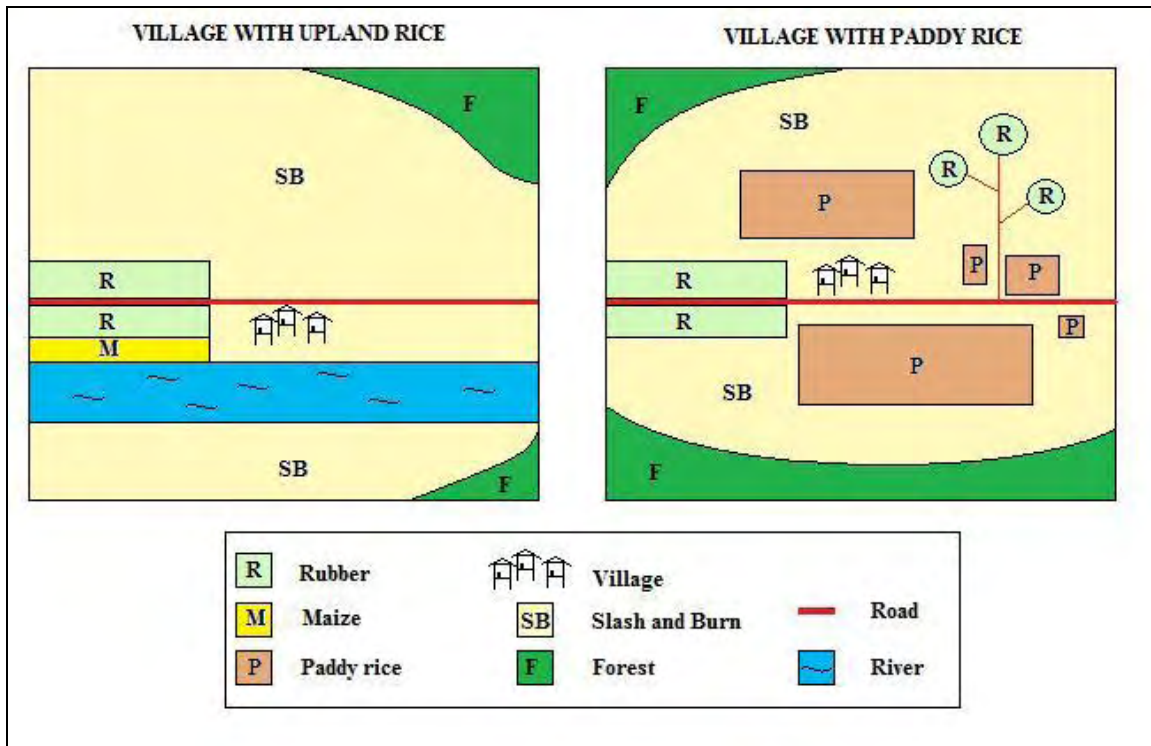


Figure 4: Spatial organization of rubber at the village level

i. Paddy rice cultivation

The villages where there is a predominance of paddy cultivation present a more dispersed land use pattern. There are several patches of rubber, always connected to roads, sometimes through secondary networks. Even if some are grouped together, these patches are interlinked with other cultivation plots such as annual cultivation (vegetables, or perennial, such as teak plantations). In the figure 3, the slash and burn land (*Hay*) actually stands for several purposes such as reserve land, upland rice, to keep the livestock. The villages in Sangthong District are a perfect example of this spatialization.

ii. Upland cultivation

In the uplands, the situation is a bit different. Rubber is grouped in a same big plot, to facilitate the management of livestock and labour organisation. It can be found alongside the main road, and is often associated with nearby maize field. This organization is found mostly in the northern part of the country, and can be seen in the villages of Nalae District.

Rubber fields are almost always planted in former shifting cultivation fields. In Thakek and Nalae District, the land was in majority inherited by the farmers. However, in Sangthong District, farmers from the first wave of plantation generally bought land to plant rubber.

d. At the plantation level

Technically two types of spatial organization of rubber plantations can be found in Laos. The two illustrations bellows are taken from a promotional poster in the hall of the DAFO of Sangthong presenting rubber and the advantage of contract farming.

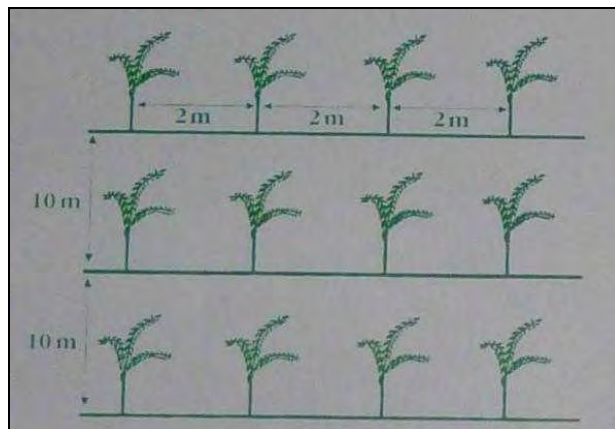


Figure 5: Plantation in line (2x10).

Source: Detail of a promotional poster for the V-Power Cie, in Sangthong DAFO

The first layout is made of straight lines, which spacing is in a range between 2.5 to 5 meters width on one side to 6-10 meters length on the other side. The density ranges from 400 to 600 trees/ha, with a target of 500 trees. This was the most popular arrangement within our sample. The simplicity of carrying out the plantation and its recommendation

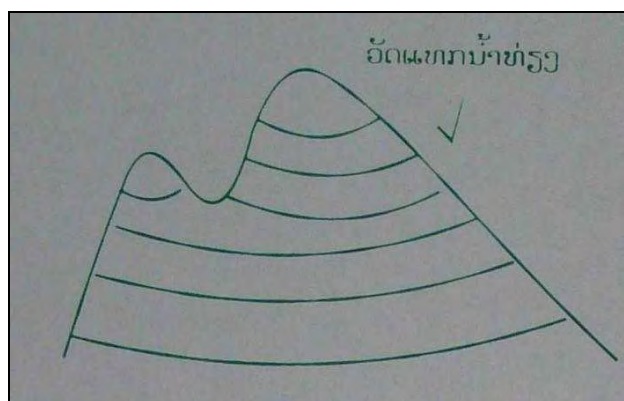


Figure 6: Plantation following topography.

Source: Detail of a promotional poster for the V-Power Cie, in Sangthong DAFO

The second possible layout is made following the topography. Almost none of the farmers interviewed had ever heard of such an arrangement, and none used it. However, while flying over Luang Namtha city, and visiting the village of Ban Had Nyao, it was clear that the earlier plantation in the north were following this spatial layout.

3.1.1.4 Actors

The actors in the rubber industry can be reduced to three categories: the government, rubber industry and farmers. The relationships between actors have shaped the expansion of rubber plantation and influence the choice of rubber regimes.

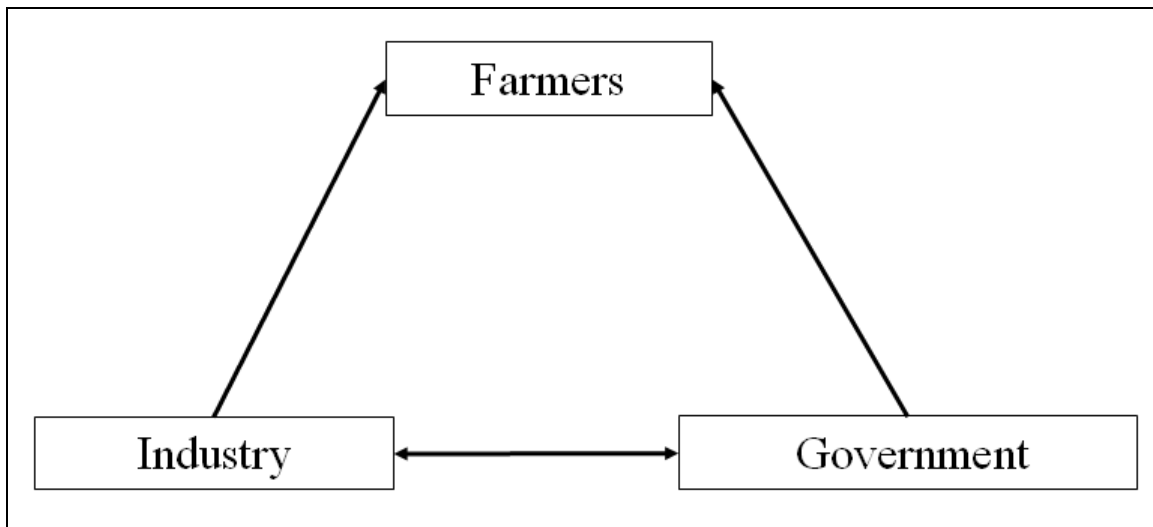


Figure 7: Rubber main actors

a. The Government

The State has to be considered at two different levels, the local authorities and the central administration. The local authorities represent the provincial and district levels.

At the provincial level, concerned department such as the agricultural industry departments were investigated. The provincial department of planning and investments (Provincial DPI) is under the authority of the Department of Planning and Investment, part of the central government of Vientiane. The Land Authority has the responsibility for the major arrangements and management of concessions. It attributes land for explorative purposes, gives the legal authorization. Nevertheless, some lands do not fall under its authority. It is the case of military land, under the authority of the Ministry of Defence. Finally, the Province Agricultural and Forestry Office (PAFO) is a primordial actor, in link with each District Agricultural and Forestry Office (DAFO) of the Province.

It is important to differentiate the provincial government, where some outstanding key persons are primordial in the rubber industry of the area, and the district authorities.

The DAFO is the main governmental actor at the local level, often in association with the district governor. As a matter of fact, they try to be present in the field and be involved in the rubber expansion through the companies or the land management. However, their lack of resources weakens their action, in spite of some ingenious scheme to support the transition from shifting cultivation to cash crops.

The Central government, on the other hand, is constituted by the Ministry and the major agencies. It is based in Vientiane, but has branches in the provincial towns.

b. The Rubber industry

The rubber industry, as seen earlier, is diverse and plurinational. The major rubber companies are mainly Chinese (14) and Vietnamese (3). Joint ventures are becoming more and more important, but the nationality of a company can be difficult to assess as the investment can be done by remote partners. Companies from various industries and nationalities are joining investment strategies to take over the market.

The industry can be present at several levels, depending on its size. Only the biggest companies are present at a national level, and would then have links with the central government. In this study, it was the case of the Lao Thai Hua Rubber Company, a joint venture between Thai, Japanese and Chinese interests.

- < Thailand: Thai Hua Rubber Public Company: 45%
- < Japan: New Jien Chieng: Honda 35%
- < China: Jieng Xieng: 20%

Other companies are smaller, and while having no links with the central government, compensate that by a very dynamic relationship with the district authorities.

Multiple activities are quite common for industries involved in rubber cultivation. Some, as the Lao Thai Hua Rubber Company, have links with the car industry, while others are much more diversified, from car dealership to wood processing.

The organization of rubber companies at the district level is following two different patterns, depending on the implication of the rubber company in the districts. The first instance is where a company happens to have a representation in the district town. It was the case in two out of three districts (Nalae and Thakek Districts). The district office serves then as a local base of operation for explorative and logistical purposes. The second case, in which the district has no local representative of the company, supposes an increased collaboration with the local government.

c. The Farmers

Farmers are a much diversified group, with differences notably based on the farming systems they adopt. On one hand, they are all growing rice, either paddy or upland rice, depending on their location. On the other hand, the difference is based on the other grown crops, the importance of livestock or any other complementary activity. There is also an ethnic factor.

Labour organization is of a paramount importance, considering its influence on crops and farming systems.

The first basis of labour organization is the household, which supplies most of the workforce for cultivation. The extended family is utilized in period of heavy labour, as the weeding or plantation.

Farmers are also organized in units. Each unit regroups around 10 households, each with a leader, who answers to the village headman. The roles of these units differ from village to village. Firstly, units have an administrative role and this in all villages. This functions as a relay to help the headman to transmit the information. Second, it can be part of a labour exchange scheme. Thirdly, it can be used as a basis for a savings group.

3.1.1.5 Coexistence with other agricultural options

Rubber is a relatively new cultivation, and is quickly taking its room in a variety of cropping options, making a transition from a traditional set to a more cash crop oriented system.

In each of the locations, rubber was associated with at least another crop. This association came from two actors: it was either promoted by the farmers or the industry. By example, in Luang Namtha, the Jia Xuang company developed a system parallel to rubber, promoting maize cultivation, aiming at the same target that with their rubber strategy. This second option was incorporated a few years after the introduction of rubber. On the other hand, farmers diversify their activities by introducing other cash crops (either annual or perennial, to their fields. In Khamouane Province, the main of only option, was banana trees. In Vientiane municipality, the focus was more on perennial cash crops as teak and agarwood. Globally the landscape was more diversified.

smooth. Rubber plantation is becoming a dream crop that people believe will change their life. But how much will it affect their livelihood is an important question that might be Some agricultural activities have suffered. One of the most important examples is the impact on animal husbandry. Livestock is an important part of the traditional Laotian system, and has an important social role, for savings, religious and traditional purposes.

Several kinds of driving forces depending on actors and areas are interplaying on both the spatial and time dimensions, affecting the rubber expansion. At a macro level, the spatial factor is easy to see.

3.1.2 *The driving forces behind the process*

As seen previously, rubber plantations are at the crossroad of forces of change. This transition process is influenced by different forces of change which favour the catalyst sectors and actors interact.

To simplify the situation, a classification using the classic push and pull factors between external and internal pressures has been completed. Within this classification, several global themes can be found. The first one, implicit in all the work, is the agrarian transition. Then, cross-borders and regional interactions between Laos and its neighbours are dealt with. The third subject concerns the rubber models of development, and the rubber regimes. Finally, the last themes are the socio-economic ones.

3.1.2.1 *Push factors*

The push factors are principally coming from the central government with their policies. They focus mainly on land problematic such as land use and land tenure.

The transition illustrated by the increased importance of cash crops has principally been pushed by several governmental policies. These policies are based on three interlinked objectives:

- Eradication of opium production
- Stabilization of shifting cultivation
- Poverty alleviation

In March 2001, the 7th Party Congress outlined the socio-economic guidelines on poverty eradication and sustainable economic growth, based on three pillars: economic growth, socio-cultural development and environmental preservation. Furthermore, they have developed a global strategy: the national development potential had to take into consideration regional and global opportunities, to enhance the Lao PDR economic integration.

factor. The systematic denigration of the shifting cultivation was carried out as well in often accused of being the cause of deforestation (Fox, 2000). This denigration of the traditional farming system particularly prevails in the northern part of Laos. The government has therefore developed a series of policy to support its eradication. One

quantitative objective was to stabilize shifting cultivation by 2005 and then have it phased out by 2010 (GoL, 1997, 2004).

The land reform, begun in the nineties, was also a mean to eradicate- or at least stabilize shifting cultivation (with the same deforestation argumentation) coupled with an agricultural intensification and an increase of tax revenue. The article 17 of the Land Law details the amount allocated for different land uses, as can be seen in the table 12. The allocation of land is therefore linked to the productive capacity of the family. There were two types of land registration, the systematic and the registration by request (Article 44 (GoL, 1997)).

Table 12: Determination of scope of right to use agricultural land (GoL, 1997)

| Land use | Maximum area per labor (ha) |
|--|-----------------------------|
| Rice and livestock | 1 |
| Industrial plants and seasonal vegetable | 3 |
| Fruit trees | 3 |
| Grass for livestock | 15 |

The authority of allocation activities rest in the hands of the local level: the district and municipalities, which have to give a land certification valid for three years before land title should be provided (GoL (1997), Article 18). However, we have never seen such a document in the studied villages, even if the three years term was up.

Land cannot easily be transferred as specified in the article 48, unless through inheritance¹³ (GoL, 1997). However, it is possible to shift it through transfer, grant or exchange. Necessary documents have to be given to the Land Administration of the districts and provinces. Upon verification, measurement should be taken by the land officers and a map produced.

From this implementation, land management is crucial for supporting the land use intensification, including for agriculture. So, a new agriculture system was needed to replace the shifting cultivation, which is considered as an extensive one in terms of land utilisation.

U q o g v k o g u " e c n n g f " v j g " õ i t g g p " i q n f ö . " k v " k u " c prospects. However, the establishment of the plantations can be costly, and requires some technical skills, which makes it beyond reach for many farmers.

Secondly, the poverty alleviation is also a governmental objective. For this purpose, one of the 7th Party Congress long term development strategy is to halve poverty levels by 2010.

¹³ Land certificate cannot be used as well as capital contribution, to use as security or lease it. However, evidences suggest that leasing land is possible, through the tenant is paying land taxes.

the government, notably in Luang Namtha, for poverty alleviation. (GoL, 2004). Rubber plantation is used by the government, notably in Luang Namtha, for poverty alleviation.

The cooperation between Lao PDR and its neighbouring countries became more and more a common thing, especially in the natural resource exploitation sector. Hydropower (Barney, 2007) is part of the resource being exploited.

The Chinese investment in the north of Laos is obvious in Luang Namtha. It is also significant in several other northern provinces such as Oudomxay and Bolikhamxay, but is happening elsewhere at a reduced scale.

In a related issue, one of the most important facts about the rubber industry is its cross-border range. This fact can be explained by both market and policy factors. The members of networks established across the borders, especially the Chinese border, favoured their relatives over the distribution of technical knowledge, access to capital and inputs.

Alton & al. (2005), Antonella (2006), Manivong & Cramb (2007), Shi (2008) and Vongkhamor & al., (2007) underlined the importance of different networks in the adoption and diffusion of rubber plantation. One of its aspects is the social networks present in the North of Laos, within the ethnic groups, and their mutual interaction. The main network influencing the adoption of rubber in our study proved also to be the kinship. However, the important of Thailand is to be added to the Chinese importance, in the neighbouring province. Sangthong and Thakek District both presents the case of farmers influenced by Thai kinship plantations.

Another strategy that is regionally contrasted is the eradication of poppy or opium cultivation, which for decades was one of the main strategies for the northern Laos. It has pushed the need to eradicate shifting cultivation, as opium was an important component of it. The target was to eliminate that production by 2006 (GoL, 2004). However, this goal is still not reached, even if the opium cultivation has largely decreased. In Luang Namtha, some rubber plantations alongside the road bore a sign of the poppy eradication fund.

poverty have become the main push factors for the rubber cultivation, as indicated by the identification of rubber as a key poverty alleviation strategy and instrument to fight against shifting cultivation by the 5th Party Congress of Luang Namtha Province in 1991 (Shi, 2008). It was thus becoming necessary to find replacement strategies for the Lao Uplands, as diversification and intensification.

Confronted with several strategies, developed by an array of actors, the GoL endeavoured to back up the rubber development. First, a concession moratorium was declared the 8th q h " O c { " 4 2 2 9 " d { " N c q u ø " R t k o g H a n s e n, 2 0 0 7) over the D q w c u q p establishment of new concessions of 100 ha. The purpose of this moratorium was to review the existing strategies to grant concession land and improve them, based on studies of their shortcomings. This moratorium was important in the rubber development strategies as rubber is one of the industrial crops most planted in concession.

U g e q p f n { . " v j g t g " k u " c " r t g u u w t g " h q t " v j g " u w e e g
composed of several stakeholders such as local government members, NGOs and
scientists, and it can be observed in the northern province of Laos. The 5th Congress
Party of Luang Namtha, in 1991, gathered the province of Luang Namtha, Bokeo and
Oudomxay. They decided then to promote the smallholders development. The GTZ is
also supporting this policy.

But another model of development supported by the government, at least orally, is the
joint venture between investors and farmers, in a contract farming arrangement. The
inputs and profits are supposed to be shared by both of them, in several kinds of
arrangements.

The success of smallholder plantation relies upon a low rate of rubber mortality. To reach
these objectives, it is necessary to supply information, as well as to complete to the
information already available.

Then, extension material support was becoming more important, with the contribution of
governmental institutions such as the NAFRI or the NAFES. An information campaign
has been implemented in 2008 to this effect, by the Laos Extension for Agriculture
Project (LEAP)¹⁴ (Vientiane Times, 2008). Called *Think before you plant*, the goal of the
campaign was to accompany all the actors in their decision-making. Doubtlessly, farmers
are prime targets, with information on what to plant, when, where and how. But the main
target is the extensionists who receive tools for a strategic intervention.

F w t k p i " v j k u " e c o r c k i p . " v j g " i w k f g ø u " q d l g e v k x g
rubber plantation. Radio spots in three languages¹⁵ and leaflets were provided to support
the promotion of the strateg { 0 " C u " y g " j c x g " u g g p " k p " q w t " u v w f { " }
have access to any source of Lao technical information. Some farmers had access to
technical books in Thai.

This campaign is coexisting with the social promotion of the 2+3 contract farming,
encouraged by both the government and the social networks. It is backed up by
governmental incentives to institutionalize its expansion. Legal documents are developed;
framework and guidelines for contract farming are spread to encourage a fair distribution
of benefits and to inform farmers on their legal rights and obligations.

Within our study villages, Ban Phouvieng was the first village who planted rubber in
Nalae district, in 2004. This was an initiative of the district authority, in collaboration
with the Agriculture Promotion Bank which offered a special credit. With an interest rate
of 2% per year, this credit had to be reimbursed within 10 years. This incentive was set
up as per the example of Ban Had Nyao.

¹⁴ Documents available at DAFO and PAFO office.

¹⁵ Three radio spots were aired in rubber producing regions, in Lao, Khamu, and Hmong languages. They
were focusing on strengths and weakness of rubber, risks involved in rubber planting, and finally the
alternatives to rubber planting (LEAP, 2008).

For all these factors, a productive and regular cash crop was a good choice. Rubber plantation was a particularly good choice as it had already a good market, and is not too difficult to be grown.

3.1.2.2 Pull factors

The pull factors show a diversity of influences. They incorporate factors which motivate actors to turn to rubber. By evidence, the influenced actors can be the industry, the government and the farmers.

First, economics factors are quite important, as rubber is an attractive crop, in a particularly attractive geographical context. The increased demand of natural latex makes its growing economically attractive.

Secondly the social factors can often be linked to the ethnic factors, as it appears in interviews. Initially, the cross borders influence had a huge impact on the beginning of the rubber cultivation and the adoption of rubber. Farmers were able to see at their

Also, the policy of crop diversification carried out by the government provides incentives for farmers. Even if there is rarely a financial incentive, except in some famous instances¹⁶, there are other ways to encourage the diversification of the agriculture.

Diversification and modernisation of the agricultural and forestry sector were the objectives for the agriculture and forestry sector of the National Growth and Poverty Eradication (GoL, 2004). In this regard, the links with the shifting cultivation eradication and the market orientation of the agriculture are important.

Regional policies regarding rubber also cover:

- Crop diversification, linked with reduction of shifting cultivation, and market orientation of the agriculture.
- Regional policies regarding rubber (North, Central and South region of the country).

Moreover, plantation can increase land security. Rubber trees sustain land use rights over land that could be under threat for various reasons such as allocation, conflicts, and attribution for concession (Alton & al., 2005).

¹⁶ The most notable case was the financing of the rubber plantation of Ban Had Yao. In our study, it was also the case of Ban Phouvieng.

3.1.2.3 External pressure

As seen earlier, rubber expansion in Laos is influenced by some of its neighbours, and in a general manner by several external factors. Thus, it needs to be considered in a regional and in a global context.

Political links have to be taken into consideration. The Lao RDP has a special relationship with some of its neighbours: China and Vietnam, the ASEAN countries.

The international market and demand are important; it is driven by the tremendous demand for several products. Burger and Smit (2004), in Alton (2005) estimate the increase of world consumption of rubber to 27.7 million tons by 2020

Tavarolit (2006) estimated that, between 2001 and 2005, the natural rubber price increased by 96.53% due to three factors. The first one is the recovery of the world economy, precisely of major rubber producing countries such as Thailand, Indonesia and Malaysia, from the Asian crisis in 1997. The second one is the increased demand of the Chinese Market. The third one is the crude oil price increase that had an impact on the synthetic rubber price.

These economical factors had a huge impact on rubber plantations. Following the situation in neighbouring countries, foreign companies started to move into Laos to ensure a continuous supply of rubber, which is guaranteed by various contracts such as the famous contract farming or concession

In the same trends, there are important links in rubber preproduction. The first aspect is the provenance of rubber seedlings. In this part of the country, there is a strong kinship network in this part of the country. In other parts of the country, foreign companies also have direct links with their own country, importing specific seedling varieties to meet their quality standard.

There is a demand for non-processed rubber, or rubber with limited transformation. This is due to several factors, including the non existence of a latex processing industry¹⁷

There are growing concerns about the impacts of rubber plantation. Two kinds of concerns are expressed: ecological and socio-economic impacts. The ecological worries are based on Chinese studies (Li & al., 2007, Liu & al., 2006). Social fears comes mainly as an internal pressure to counterbalance what is perceived as an over expansion.

¹⁷ There are currently some small factories, such as the Lao Latex Fabricant but this case is anecdotic.

Furthermore, the cooperation between Lao PDR and its neighbouring countries is more
c p f " o q t g " y k f g n { " u r t g c f . " g u r plantation sector." k p " v j g
Meanwhile the hydropower and the mining sectors are most involved with joint venture
and foreign capital. The main investor countries (from three years ago until this year)
were Thailand, Vietnam, and then China.

3.1.2.4 Internal pressure

The internal pressure concerns principally potential constraints to a straightforward
expansion. Some represent a fear expressed by several of our interlocutors.

Workforce

Rubber plantation is high labour intensive, especially in the area of beginning of
plantation, because of the important workload to be handled by a limited Laotian
workforce. Moreover, the technical skills of the Laotian workers are limited, if compared
to the other professional labourers, for example Chinese professional tapers.

An important concern expressed in many interviews was that Chinese workers could be
brought in to avoid a labour shortage. In a slightly different problematic, this is already
the case in the Vietnamese concessions.

In the case of smallholders, the situation is a bit different from the previous one. When
starting a rubber activity, the primary labour is mostly provided by the smallholder
household or extended family. But the future nature of the workforce is less known.

Based on our interviews and focus groups with Women Union, the villagers are sure that
c v " n g c u v " q p g " q h " v j g k t " e j k n f t g p " y k n n " e c t t { " q
The socially acceptable answer presented was that children will stay and help their
parents. But while making informal chat, some villagers complained that young villagers
f k f p ø v " j c x g " c " n q v " q h " q r r q t v w p k v k g u " k p " v j g "
contradiction to their official answer.

Only some interviewed farmers said that they planned to hire workers to tend their
r n c p v c v k q p " c h v g t " v j g k t " t g v k t g o g p v 0 " V j k u " ð t g
disruption of the traditional lifestyle. Working at night or in an early morning shift, every
one or two nights requires good health conditions that might be a constraint for elder
smallholders.

The land security of the farmers involved in rubber cultivation could be at stake, in
different ways. In contract farming, some contracts are ambiguous. Not only that, but also
the penalty for the farmers who are unable to provide the expected amount of latex, or
losing rubber tree by bad management, could be fined. This not being compensated by
the limited amount of their savings could result in the take-over of their land, either by
the companies or by money lenders.

Based on this observation, the insufficiency of the extension network or the knowledge gap is a real problem on the field.

For that, there are good initiatives from GoL, such as the moratorium, the promotion of fair contract farming, production of extension material. However, the application of these elements is not yet optimal, as it seems that the government is overwhelmed by the speed of the rubber spreading.

Food security

Food security is one of the main risks in rubber plantation implementation. Ensuring food security is one of the development goals of the National Growth and Poverty Eradication (GoL, 2004).

self-sufficiency in rice to survive for all of the year. Rubber and food crops are planted during the maturing years (three years possibility). With this intercropping, the yield for food crops may be insufficient, especially in the case of disaster. However, Vongkhamor & al. (2007) mention that farmers in Oudomxay and Luang Prabang Province have only devoted a part of their land to rubber plantations, keeping some to ensure their food security. This strategy might work if farmers have enough land (Thongmanivong & Fujita, 2006).

3.2 Emergence of rubber institutions at the local level

In this multi-level context of rubber emerging as green gold, several arrangements are found at work.

3.2.1 Rubber regimes: different ways of managing land, labour, capital, access to market and information

Box 4: Regime definition

norms, rules and procedures that structure the behaviour and relations of international actors so as to reduce the uncertainties that they face and facilitate the pursuit of a Regimes are international social institutions in that they that prescribe behavioural roles, constrain activity and shape

The main guideline of regimes is the norm of behaviour that a regime builds itself upon. It restricts the freedom of choice of the actors and shapes their mutual relationships.

The regimes are then shaped by their main actors and their binding

obligations. As illustrated in the figure 13, the three main actors of the rubber industry are the farmers, the industry and the government (at both local and central levels). The binding obligations are created between actors, and are facilitated by norms and rules.

Overall, the rubber expansion is creating socially expected behaviours with regard to the various regimes. A rubber regime is then a particular arrangement of several factors, each of them structuring the behaviours of the actors.

There are three main rubber regimes in Laos, which could as well be found in other crop cases, such as maize. While the classification is based on several factors, an intuitive classification, broadly used, is actually based on the leading actors in each regime.

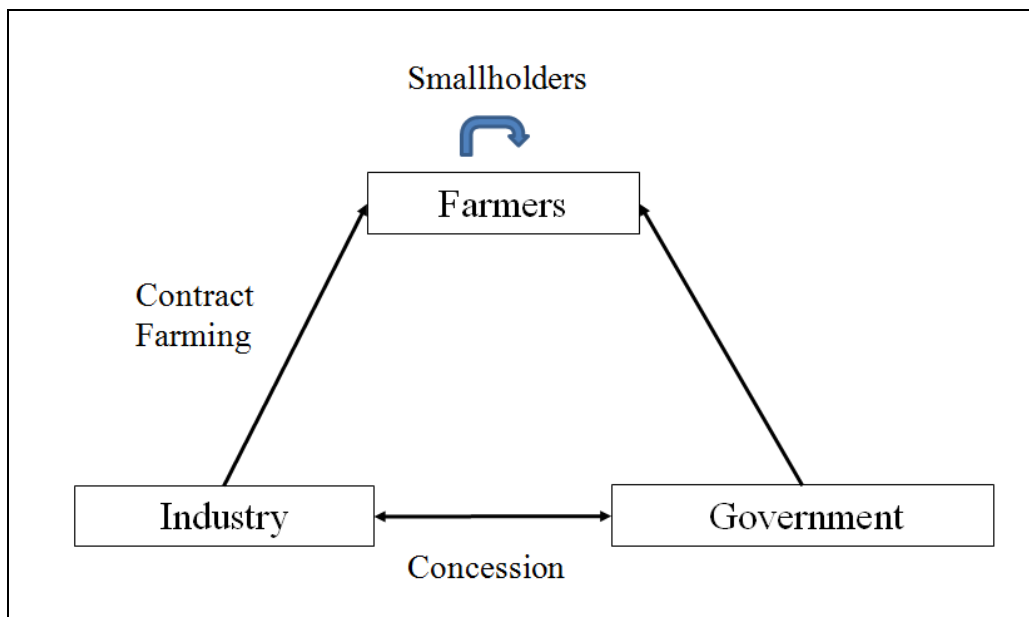


Figure 13: Rubber regime, a balance between three actors

The different possible equilibriums between the actors influence the rubber regimes, following the leadership of one actor.

3.2.1.1 Five factors determining the rubber regime

These regimes can be summarized in the relationship between the three main actors: farmers, government and the industry. Each possible configuration in the figure X is corresponding to a configuration of power, interest and knowledge (Smouts, 2008), which *de facto* leads to the leadership of one particular actor for each regime. Several configurations were found during this study, and example can be found in annex X.

These factors are the management of land, labour, capital, access to market and information. The norms for each of these factors are integrated in the society, and shape the social interactions between the actors.

Each regime is characterized by a combination of the five factors, which are land, labour, technical inputs, capital, marketing and technical knowledge.

a. Land

One of the major factors of the regime, which has wide consequences on several issues in Laos, is the land management.

V j g t g " c t g " h q w t " y c { u " q h " õ c e s w k t k p i " n c p f ö <

- < Transforming its own land for rubber plantation: the land was often previously used for growing rice or in sometime vegetables.
- < Acquisition: The land is bought specially for the purpose of establishing a rubber plantation. The transfer is approved by the village headman.
- < Communal land: In the North, some villages have delimited a rubber area, and villagers have been assigned plots inside this area.
- < Long term rent: This concerns principally the state land that is rented to companies to form concession.

It has to be noted that the land is shifting from subsistence cultivation to commercial cultivation.

Table 13: Property-Rights associated by rubber regimes (Land Ownership (after (Schlager & Ostrom, 1992))

| | Operational level | | Collective choice level | | |
|-------------------------------------|----------------------|--------------------------|--------------------------|-------------------------|--------------------------|
| | Access ¹⁸ | Withdrawal ¹⁹ | Management ²⁰ | Exclusion ²¹ | Alienation ²² |
| Smallholder (with own funds) | F | F | F | F | G |
| Smallholders (government officials) | F | F | F | F | G |
| Smallholders (funds of kinship) | F | F | F | F | G |
| Contract Farming (credit) | F/I | F/I | F/I | F/I | G |
| Contract Farming (3+2) | F/I | F/I | I | F/I | G |
| Contract Farming (2+3) | F/I | F/I | I | F/I | G |
| Contract Farming (1+4) | F/I | I | I | I | G |
| Concession | I | I | I | I | G |

This table, adapted of the concepts of Property- Rights Regimes by Schlager and Ostrom (1992) with the inclusion of our results, presents the property rights of the different regimes. Each right, if applicable, is attributed to the actors who possessed it. In some case, two actors share a same right. F: Farmer, I: Industry and G: Government

Each of the actors present in each regime has rights²³. As the land is owned by the government, and only certificates of use are available, the rights of alienation in theory solely belong to the government.

A position can be determined by association of a bundle of rights (Schlager & Ostrom, 1992). There is a gradient of four classes of property-right holders. But, as there are several actors involved in each regime, two positions can be present in one regime.

¹⁸ It is the right to access physically to a defined property (Schlager and Ostrom, 1992).

¹⁹ It is the right of usufruct (Schlager and Ostrom, 1992).

²⁰ It is the right to plan and control the use of resource, and transform it by improvement (Schlager and Ostrom, 1992).

²¹ It is the right to decide the accessibility to a resource and the transfer of this right (Schlager and Ostrom, 1992).

²² It is the right to transfer (either by sell or lease), either of the aforementioned property rights (Schlager and Ostrom, 1992).

²³ As defined by Schlager and Ostrom (1992), « rights are the products of the fit between the actors and the notion of regime.

Table 14: Property-right holder positions in rubber regimes (based on (Schlager & Ostrom, 1992)).

| | Authorized user ²⁴ | Claimant ²⁵ | Proprietor ²⁶ | Owner ²⁷ |
|-------------------------------------|-------------------------------|------------------------|--------------------------|---------------------|
| Smallholder (with own funds) | | | F | |
| Smallholders (government officials) | | | F | |
| Smallholders (funds of kinship) | | | F | |
| Contract Farming (credit) | | | F/I | |
| Contract Farming (3+2) | F | I | | |
| Contract Farming (2+3) | F | I | | |
| Contract Farming (1+4) | F | I | | |
| Concession | | | I | |

Based on the distribution of rights established in the table X, actors are property-rights holders in rubber t g i k o g u 0 " V j g t g " k u p ø v " c p { " r q u u k d k n k v { " q h " q y p g t " r q u k v alienation

F: Farmer, I: Industry and G: Government

The main difference between the smallholder and contract farming regimes, with regard to land tenure, is in the involvement in the land management. Management rights exercised by farmers are the essential key to the property of smallholders. In the contract farming regime, management is performed by the industry, and the farmers fall under the status of authorized users, on a land that would otherwise be theirs (at least in a proprietor sense).

G x g p " k h " u o c n n j q n f g t u " j c x g " v j g " t k i j v " q h " g z e n concession regime; where maps are drawn, and land removed from the land use plan of p g k i j d q w t k p i " x k n n c i g t u 0 " Q p " v j g " q v j g t " j c p f . " u the exclusion of livestock from their rubber plantation, by land-use planning or fencing.

²⁴ Possess the right of access and withdrawal (Schlager and Ostrom, 1992).

²⁵ Possess the rights of access and withdrawal, and management (Schlager and Ostrom, 1992).

²⁶ Possess the rights of access and withdrawal, management and exclusion (Schlager and Ostrom, 1992).

²⁷ Possess the rights of access and withdrawal, management, exclusion and alienation (Schlager and Ostrom, 1992).

b. Labour

Rubber is a very labour intensive cultivation. The two stages of rubber cultivation – immature and mature, have different work patterns.

In the immature stage, there are two different works: plantation of the seedlings and regular weeding. The labour at this stage is compressed in time, but is very intensive. Weeding can be mechanical or chemical, which is uncommon. Mechanical weeding is mostly done by hand or in some locations with the help of a grass trimmer.

In the mature stage, which generally happens seven years after plantation, the work is more regularly spread during the whole year. In fact, the work consists mainly in latex harvesting. The harvest can be organized in several ways, but is always made during the night, and must be finished in the early morning.

Labour is an important factor in the characterization of regimes. It is one of the few bargaining tips that the farmers can provide in a contract. Their work can be provided for free, and in this case they will be compensated in the sharing of the benefits. Or their work can also be remunerated, with a negative impact on their share of latex.

Several types of labour managements can be found in rubber plantations and, if some are characteristic of a particular rubber regime, this is not always the case. By example, hired labour is most commonly found in the smallholder and the concession regimes. In the latter regime, there are two types of hired work: regular company salary men, who have a full time job, and daily hired labourers. Regular salary men take mainly in charge the management of the plantation, including the supervision of the day to day operations.

In all the village, units were found. They can serve different purposes: administrative, credit management and labour exchange. The labour exchange was particularly important in the case of Ban Phavi (in Nalae District), where it was used for the labour intensive weeding.

c. Capital

The access to capital is paramount to start a rubber plantation. There are two different options for the access to capital: private funding or industrial funding. On one hand, the capital can be private, and is not regulated by contracts; on the other hand, capital offered by the industry is subject to regulations normally specified in a contract signed between the company and the farmer.

Capital includes the supply of inputs, including seedlings, fertilizers and equipment. The first investment is the purchase of seedlings. In some cases, this purchase has to be

preceded by a fund allocation for the land preparation, depending on the type of labour
c x c k n c d n g " * j k t g, and the region " q t " q p g ø u " q y p +

In the premature phase, there is no actual fund transfer; that relates more to a payment in kind. In the mature phase, there is supposedly a transfer of funds between the company and the farmers, although its modalities are frequently unclear and not always specified in the contract. The contract specifies the sharing of the harvest, fixing the percentage of
g c e j " r c t v p g t ø u " u j c t g u 0 "

d. Access to market:

That should be one of the most distinct factors. This access is possible through the industry, or a network of producers. It is striking to notice that, in a lot of cases, the access to market is not the paramount factor in the decision for rubber.

Farmers without the support of the industry rely on their current networks to find potential buyers. The networks involved are mainly familial or ethnic, include family members currently producing latex, and having already links with the market.

e. Technical knowledge

It is one of the most important factors for the success of the plantation. It impacts on all the different stages of the cultivation: selection of the right area, right seedlings etc. Each stage of the cultivation requires some specific care. The establishment of the plantation has to be done following certain rules, such as density or adapted varieties, for maximising its future production.

There are five ways of knowledge transmission:

- a. Learning through work in a rubber plantation: It is very common at the border with Thailand. Some work in it as a way to learn new skills in relation to rubber. For other, it is unskilled work, but which will sensitise them.
- b. Advising by company technical advisors: Specialists are employed by companies to advise farmers and inspect their plantations. These specialists are often of the same nationality than the company. Chinese companies in Luang Namtha are known to have Chinese specialists. That can lead to problems of communication between farmers and advisors, requiring the employment of translators.
- c. Advising by family members: The help of family members already investing in rubber can go further than only offering advice on how to plant rubber. It can have an important impact on the adoption.

- d. Advising through a rubber group: Such a group was seen only once during our study. It was constituted around a successful rubber farmer, and was offering credit in addition to technical advice.
- e. Advising through books: Thai technical books were available. They were bought in Thailand, and mostly found along the border side.

The combination of these inputs can be broken down in three main regimes: smallholder, contract farming and concession, as presented below.

3.2.1.2 Three main rubber regimes: smallholder, contract farming and concession

3.2.1.2.1 Smallholders

Smallholder is a leading social role model in the North. In the rubber domain, it is considered the most adequate way of cultivate rubber, appropriate to give a decent livelihood.

Box 5: A truck full of hope on the road to Ban Had Nyao

To convince the villagers to invest in rubber plantation, a Chinese company decided to show them a dream become true. With the visit of the mature plantation of Ban Had [c q . " v j g { " u c y " y j c v " v j g { " e q w n f " c e j k g The entire village took the trip, piled in a truck. For some villagers, it was the first time that they travelled. The rubber plantation and the prosperous look of the successful Hmong village had an important impact on the hopeful rubber planters.

This *green gold* is considered the perfect cash crop to alleviate poverty, by giving regular revenue.

Smallholders are pressured into rubber by their extended kinship. Following their migration from northern China, former rubber farmers endeavoured to bring new techniques to their communities.

There are three smallholder sub regimes: *õ v t c f k v k q p c n " u g p u g ö " u o c n n* smallholders, and familial organization smallholders.

- a. *õ V t c f k v k q p c n ö " u o c n n j q n f g t u <*

This regime is characterized by the empowerment of the farmer. The farming scale is small. The labour management changes during the season and, depending on the amount of work, is a mix of own and hired labour. The source of knowledge varies, but farmers try to obtain several sources to override their lack of knowledge.

b. Corporate smallholders

These farmers are investors who specialized in rubber, but mainly work in a different field. The labour is principally hired; in some occasions, at crucial steps, the owner participates himself.

c. Familial organization smallholders:

These farmers function in association with extended kinships who provide sometimes labour, but principally capital and knowledge.

The capital factor is very specific in these regimes. The funding is provided through private channels, without any recourse to external capitals, other than kinship. Thus, the extent of smallholders financed through kinship networks is difficult to evaluate, as these investment capacity, which limits the size of their plantation and may impact on their inputs/technical level.

The access to market is the most limited of all regimes, and is often put aside, especially in the traditional smallholders sub regime. The other smallholder sub regimes benefit of a better network which will be essential in their access to market.

The market is currently in expansion, and some smallholders have faith in their capacity to find a willing buyer without trouble in several years.

3.2.1.2.2 Contract Farming

Contract farming is an important driving force of the rubber expansion. For a lot of interviewees, it is seen as one of the few means which allow them to be part of the rubber revolution. This feeling is shared by companies, who consider it to be the only way to generalize the rubber cultivation efficiently.

The sub-regimes of the contract farming are divided according to the intensity of the contract. Actually, there is a graduation in the sharing of the five inputs, from a minimal implication of the companies to a heavy involvement.

The common factors in all the Contract Farming sub regimes are the contribution of the industry to the capitalization and the supply of technical advice.

Box 6: Contract Farming definition

Contract Farming is defined by the existence of an agreement between farmers and a company -with processing or marketing capacities. This agreement regulates the production and supply of a specified agricultural product. The farmers are supposed to be supported by the company through supply of inputs and technical advices. A commitment is required from both sides; the farmer is expected to provide fixed quantities of the aforementioned product at a predefined quality, in exchange of an obligation for the company to buy its production. The price is commonly determined in the contract (Eaton & Sheperd, 2001).

The discriminating factors between the sub regimes are principally the land and labour managements.

The capital factor is quite subtle. The funding is always external to the farmers, who are then supported financially to produce rubber. There are two major ways of funding: the industry or the government.

Industrial funding is part of the contract and is always supplied in kind, such as agricultural inputs. Seedlings are either imported from neighbouring countries or produced locally from imported seedlings. Governmental funding can be present under the credit form.

But the Contract farming has been used by some respondents as a learning tool for rubber plantation: for example in Nalae District. First, they establish a plantation under the guidance of the company. By this on the spot training, they learn the best way to select seedling and how to plant it to maximise its potential. A few years after their first experience with the company, they start, in parallel, their own smallholder rubber plantation, to maximise their profits.

They have a mixed position. They hope to benefit of their existing contractual connection with the company to obtain through it a market prospect, selling their smallholder latex with contracted latex. But no relating clauses have been put in the original contract, leading to the risk of a potential sale loss at the mature stage.

The consequences of this evolution are currently unknown, as it concerns few farmers. But if these evolutions become common, this behaviour might become unacceptable in

the contract farming regime. The company might take offence in this bypassing of their original agreement.

Box 7: From contract farming to smallholder

In a northern village, contracted farmers have decided to start their own smallholder plots, deciding that the knowledge transferred by the company was sufficient to allow them to be independent in this new venue.

They managed to buy seedling from a small nursery, and repeated the procedure they had learned from the company in their own smallholder plots. They plan to sell the harvest to the company.

The characteristics shared by all the contract farming sub-regimes are the granted access to market and the transfer of knowledge.

The access to the market is one of the biggest advantages of the contract farming. The connections of some companies with the specialized rubber markets can be strong. In fact, some companies have capitalist links with rubber processing enterprises, such as tire manufacturers. Such companies search to secure their supply of raw material at good conditions. Other companies hope to operate as brokers [intermediate], betting

on the favourable perspectives of the latex market.

Even if the marketing of the latex is guaranteed by the company in its agreement with the farmer, the terms are not always clear. Firstly, the price at which the company will buy the product is not always specified, which is understood by farmers as a commitment to the market price. This may lead to potential disappointment if the latex price drops. Secondly, the required quality of the product is almost never specified. As there are several types of latex product, some necessitating some transformation, this shadow area is dangerous for farmers.

The technical supervision by the company technical advisor varies from an enterprise to another. Some are really involved, while others experience communication problems with their farmer.

In fact, the essential key is the advisor. They are often brought by the companies from countries familiar with rubber. Experts are often Chinese, and do not always speak Lao. This language communication problem limits the interactions with the farmers and makes the use of translators indispensable. Other experts come from Thailand and Malaysia.

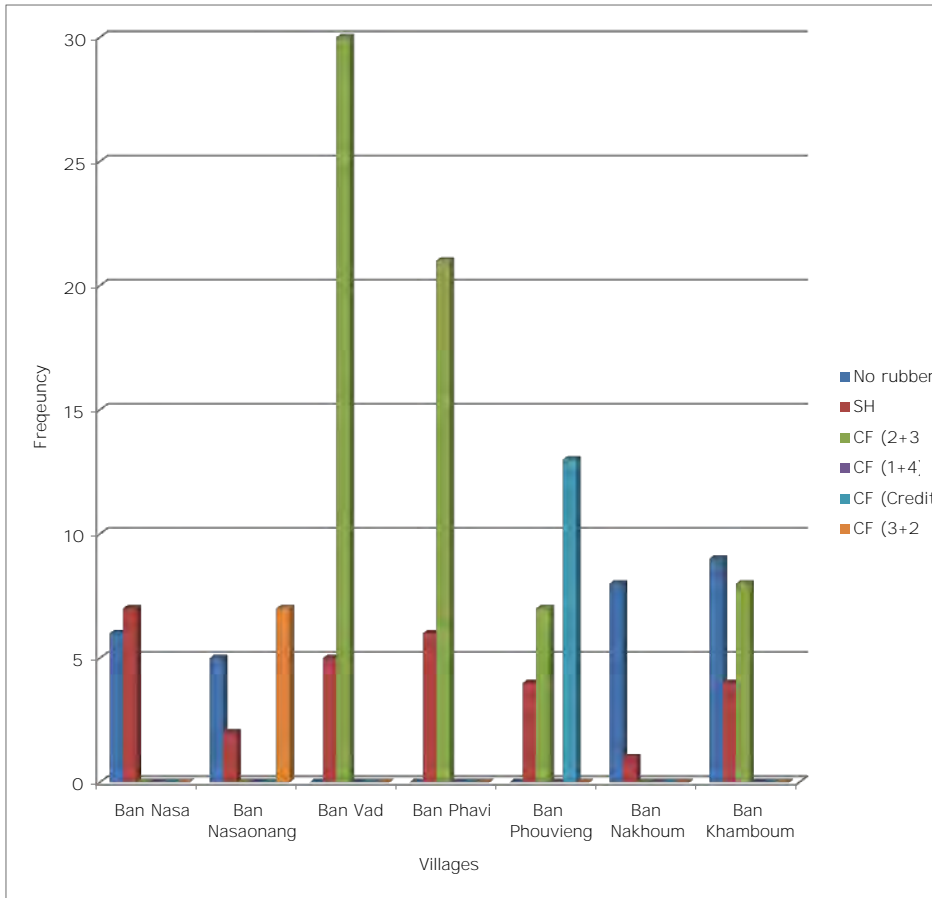


Figure 14: Repartition of rubber regime per villages

The most diversified villages, in term of rubber regime, are those in Nalae district. There is an important part of rubber plantation based on linkage with the industry. Contract farming was the first arrangement to occur, and introduced the farmers to rubber cultivation in the village of Ban Phavi and Ban Vad. In the village of Ban Phouvieng, another arrangement can be noticed: credit. Introduced in 2004, it was completed several years after by the other possible arrangement: contract farming and smallholders. Concessions are not present in this graphic as no farmers have a concession arrangement.

3.2.1.2.3 Concession

C p q v j g t " t w d d g t " t g i k o g " k u " v j g " e q p e g u u k q p " t g i
 terms of efficiency. Concessions are characterized by a scientific approach of the plantation. No means are spared to ensure a maximization of the production. Each factor is maximized through the planning of its inputs.

The lands on which concessions are established are state propriety. They are attributed either by the central or the provincial government. The central government is mostly involved through the Ministry of Defence, which can lease military land under a long-term agreement. Villagers are not involved in this transfer of land. The research of land is a specialized job. Companies have a branch devoted to land acquisition.

There are several types of labour in the concessions. Firstly, a distinction has to be made between the regular labour force, used throughout the year, and the irregular labour force, sporadically used.

The regular labour force is organized at different levels, each of them heavily relying on the previous level

- a. Staff member (1 bloc chief): The concession is divided in several small plots, each under the responsibility of a supervisor. His responsibilities are varied, but mainly concern the technical supervision of his plots. He has to watch for diseases, report the trees mortality, apply fertilizer. He plans and supervises the labour force during the plantation, and the application of fertilizer.
- b. Supervisor (4 blocs chief): He directly oversees a team of 4 staff members. He has to compile and synthesize the data provided by his subordinates. He is in charge of the verification on the field. He controls the work of the staff members under his responsibility. He has the final say in the hiring of labour in the plots.
He has to send reports to the head of concession.

The concession staff is supported by an experienced rubber expert. The rest of the staff has an agronomical and forestry background, often with an academic degree²⁸.

The exceptionally hired working force consists mainly of unskilled labourers. They come from the neighbouring villages. The conditions are considered quite advantageous by the villagers²⁹. However, the period of employment is short, as it is around one month, but the interviewed villagers declared having worked only days.

The access to market is one of their forces. The massive potential latex production of the concessions is a perfect guarantee of supply for the companies, mainly in the case of the ones which are vertically integrated, for example producing tires or cars.

²⁸ From Nabong and Dongkong Faculties

²⁹ Labourers are paid 28 000 kips a day. Transport is provided and amenities such as bottled water are given.

The technique is the most up to date possible. Their technical knowledge is excellent. They invest in the hiring of foreign rubber specialists. These specialists come from rubber producing countries such as China, Thailand or Malaysia.

In this regime, interactions are limited. Actually, the most interactive part is the labour market.

It is limited to the labour intensive months ó usually the summer months, after the farmers have finished planting their rice. It is dif h k e w n v " v q " h k p f h c t o g t u _ " f q p ø v " q h h g t " v j g o ö . " v j coming first.

Box 8: Hiring villagers

Villagers working in the concession were hired very informally. A truck came in some villages. After having parked the truck, the driver came out and asked some villagers if they were interested in working in the concession for a few days. Upon agreement, he then proceeded to transport the hired villagers to the concession, back and forth.

Unskilled labour is constituted of farmers from neighbouring villages. Their tasks consist in land clearing, fencing or weeding. Some provinces are the scene of intensive competition between agricultural companies for labour supply. In this perspective, brokers are employed to facilitate the recruitment of villagers.

The almost total control is one of the major attractions of this regime for the companies. In fact, the risk of losing latex source of supply is a reason for companies to multiply the sources by investing in several forms of rubber plantation, which therefore implicates them in several regimes. This risk management strategy is pushed by a diversification of the sites of production throughout the country.

Companies which work along both concession and contract farming keep close links between the two regimes. In a company for example, the same person is in charge for concession and contract farming in a district. He has the role of a coordinator.

There are no agreements between companies. The negotiations take place with either the province or the central government. The type of agreements depends of the attitudes of the n q e c n " c w v j q t k v { " c p f " h c t o g t u < " õ V j g " i q x g t p q t R t q x k p e g ö 0 "

First, a formal letter is sent to the governor of the province. But, according to a company o c p c i g t . " õ v j g " t g c n " v j k p i " j the village is then p " v j g " x k r t k x k n g i g f " e q w p v g t r c t v 0 " D w v " v j g " r t q d n g o " k u " v w u g ö 0 " C e e q t f k p i n { . " v j g " e q o r c p { " õ f q " g x g t { v j l c u u g u o g p v " q h " v j g " n c p f ö 0 " t V t h e c o n c e r n e d a u t h o r i t y o g p v " n g either local or central.

Table 15: Rubber regimes

| Main actor | Rubber regimes | Land | Labour | Capital | Access to market | Technical knowledge |
|------------|-------------------------------------|---|---|--------------------------------|------------------|---|
| FARMER | Smallholders (with own funds) | - bought - access -individual / grouped | -hired labour - own labour | Farmer Other (Credit Group) | Limited | -Network -Kinship |
| | Smallholders (government officials) | - bought - access - individual | - hired labour -own labour | Farmer | Average | Documentation |
| | Smallholders (funds of kinship) | - availability - bought - individual | - own HH/ relatives | Mixed (Farmer/Kin) | Average | -Kinship -Network |
| INDUSTRY | Contract Farming (credit) | - Own land -Temp Land Certificate | -HH -(Thakek : selling labour to other rubber regime) | Industry, Government | Good | -Government -Industry |
| | Contract Farming (3+2) | -Own land | - own labour | Industry | Good | - quite recent - don't know a lot |
| | Contract Farming (2+3) | Regrouped (rubber zone) | Intensive - own labour - exchange labour (units) | Industry | Good | - importance of techniques from cy. - f q p ø va'lan p q y |
| | Contract Farming (1+4) | - land insecurity | - selling labour | Industry | Good | Almost non existent |
| GOVERNMENT | Concession | -State land - power | Intensive Several type of labour (hired labour daily, regular workers) | Industry | Excellent | -Excellent - lots of inputs |

3.2.2 *Emergence of rubber regimes*

Rubber regimes are sometimes associated with one part of the country. In an extreme simplification, it can be said that in the northern area, there are mostly smallholders, whereas concessions are more frequent in the South, and contract farming everywhere else. But the situation is not that simple. As seen earlier, there are some geographical influences on the choice of rubber management. So what favoured the emergence of one rubber regime comparatively to another?

There are two main decisive factors for deciding in favour of one or another rubber regime: the local social network and the institutional and legislative frameworks.

Box 9: Social networks

It is a structure made of nodules (principally persons or organization/institution), which are interlinked by relationships.

There are several kinds of possible relationships: family, monetary, administrative or also knowledge links.

The social networks constitute a simplified picture of a social system, and can be used to understand how rubber was adopted in a particular society/organization.

G x g t g v v " T q f i g t u " u c k f " k p " j k u " 3 ; 8 4 " d q q m . " ð F k
the process by which an innovation is communicated through certain channels over
time among v j g " o g o d g t u " q h " c " u q e k c n " u { u v g o ö 0 "

3.2.2.1 The two models of innovation: equilibrium model vs. evolutionary model

There are two main models of diffusion of innovation, both being relevant to this report. These models are historically well described. The first one is the equilibrium model. In this model, technology is given. So the adoption of the new technology, in this case rubber, is dependant of the quantity of information available to the potential adopter (Niosi & Hanel, 2006). Then, the first adopters are the ones with the maximal access to information and knowledge. In this case, the first adopters were individuals with kinship linkage to rubber farmers in China. The second wave of adopters was consecutive to the implication of the industry in the rubber cultivation. Companies then played the role of key persons in the knowledge transmission.

Equilibrium models are often described as following a sigmoid curve. The beginnings are small, accelerate rapidly, and attain a climax, where almost all potential adopters have adopted the new technology.

The second model is the evolutionary model. It is based on a different context, where the information is limited and there is uncertainty (Niosi & Hanel, 2006). This uncertainty is built on several costs of information acquisition, disposal of the previous technology, material equipment or market access. This uncertainty rests with both suppliers and adopters. In this model, an inferior crop can remain cultivated due to contracts, legislations, information deficiencies or network externalities.

Table 16: Innovation model in the different district

| Innovation model | Nalae | Sangthong | Thaket |
|-------------------------|--------------|------------------|---------------|
| Equilibrium | X | X | |
| Evolutionary | | X | X |

Rubber adoption currently goes towards the evolutionary model because of this increasing uncertainty of market and potential legal deficiency of the contracts between the industry and the farmers.

The evolution from one pure model to a mix of the two models is partly based on an increase of uncertainty. One of the most important parts is the unpredictability of the rubber market.

But there is also an increase of awareness of potential adopters, causing a delay in adoption. This is due to several factors, but globally, the supposed superiority of rubber might be declining. There is a lobbying of some actors that are wary of investing only in one cash crop -rubber. Concerns are being expressed for the dependence of local farmers on foreign companies.

Box 10: Alternatives to rubber

The head of a village was telling us about his dream: a plantation. But not a plantation of rubber, as a company recommended. Not a teak plantation as some of his villagers had planted following a project of an international organization. No, against all odds, he wanted to reproduce the pine plantations of Eastern Europe where he went to study, 20 years ago. In this village, several agricultural options co-existed, which lead to a competition of potential adoption.

These concerns have to be taken with caution. Farmers delaying rubber adoption have often other agricultural options available.

Another factor, increasing the uncertainty, is the information deficiencies that are quite frequent in this context.

3.2.2.2 Social networks and leaderships

The social networks are extremely important in the emergence of rubber regime as they influence the reaction of a village to it. Networks are evolving and thus need to be reviewed at two moments. Firstly there is a witness moment, *i.e.* before the adoption of rubber. Then, secondly there is the current social network that we were able to apprehend on field.

As the diagrams representing the rubber institutions, social networks are made of three main actors: farmers, industry and the government. But if those are the main actors, the situation is far more complex than a simple relationship between three actors. Some actors are at the borders of two institutions, and works as interface between different types of actors.

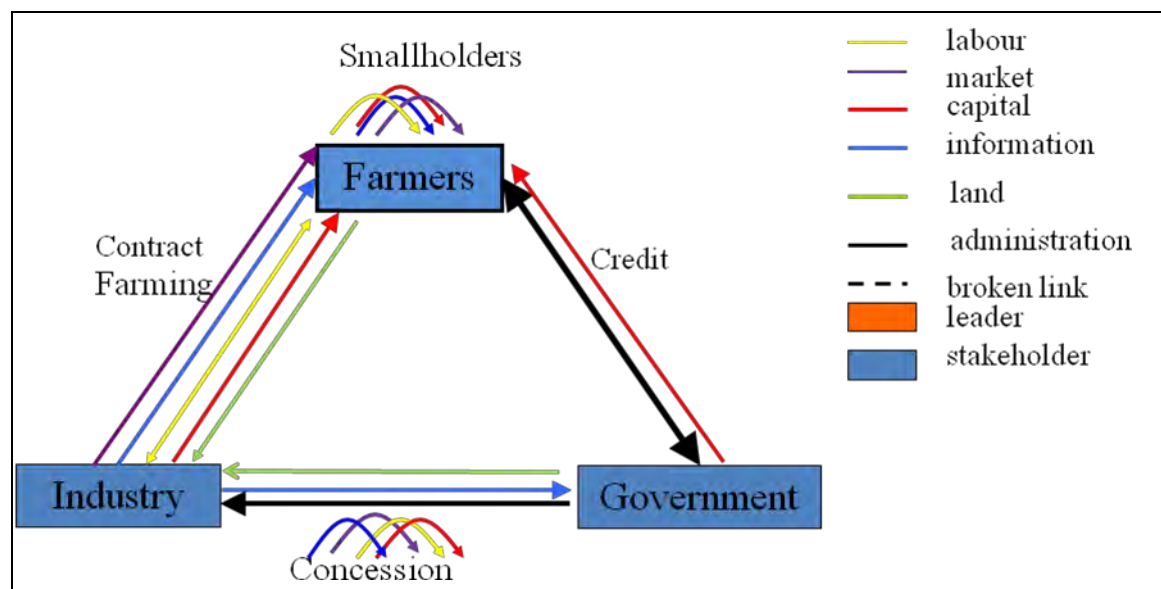


Figure 15: Relationship between rubber actors in Lao PDR

Each specific regime leads to special relationship between two main actors. The industry is a key actor for both the concession and the contract farming regime. The industry is responsible for the major flows of capital and information. Farmers are principally giving the land, and in some case, labour. Smallholders are on their own, and the information and capital mostly circulate inside the regime holders. Credit from the government mainly concerns the allocation of capital, with help from the industry to give technical information.

First, the original social network influence how the decision to adopt rubber is taken. Several factors are instrumental to this decision, such as linkages inside the network and external links towards other networks.

Nalae district

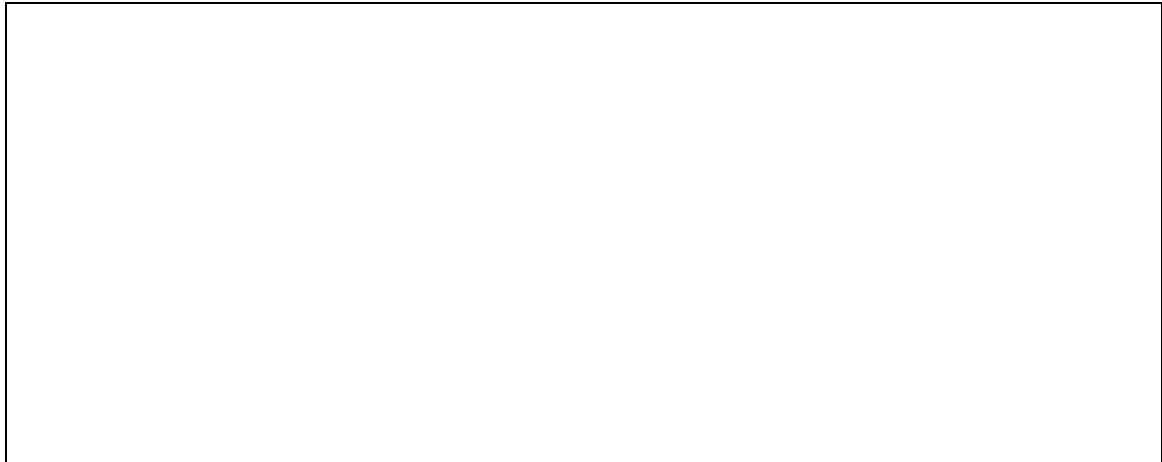


Figure 18: Relationship between actors in Nalae District

The important element of this social network is the presence of an intermediary between the industry, the farmers and the government. A member of the DAFO staff was hired by the company to be a link and a resource person in rubber in this district. They trained him, and his pay was ensured by the company. He was still officially a member of the DAFO. This allows an increasing awareness to rubber context, and increase the transmission of knowledge within the DAFO. The rubber expansion in Nalae started by the allocation of credit to the village of Ban Phouvieng, by the local government.

Privileged interlocutors

There are key persons in this network who will be influential in the rubber innovation. One of the most important components of the networks is the dual role of some actors, being at the interface of industry, farmers, and government, with an increased access to information.

There are two important interfaces that can be found in almost all the cases: firstly, the one between villagers and the industry, and secondly the one between the farmers and the government.

These interfaces describe well a situation where there is a need of an intermediary person between the farmers and the exterior, whether it is the government or the company.

One of the most important of these dual interlocutors is the head of village, who has a social and administrative role in the village. He can be central in the decision to adopt rubber, either at the individual level, or at the village. In this case, linkage is primordial.

Another privileged interlocutor is the one at the interface between the villagers and the companies. This role can be filled by different actors, either governmental or

