Market Integration – An Exploratory Analysis of Price Patterns and Transport Costs

By

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Abstract

This dissertation provides an alternative perspective on the process of market integration by focusing on market integration within a nation's borders. The dissertation intends to go beyond traditional integration theory and examine various alternative approaches to market integration by using Lao PDR as an empirical example for assessing these alternative approaches empirically in a developing country.

The main objective is to find determinants for the spatial differences in prices between locations and quantify the importance of different variables influencing the final price of the studied homogenous retail product, one bottle of locally produced Beer Lao. The conceptual and theoretical framework used seeks to identify key actors and stakeholders at different geographical levels. The theoretical framework highlights transport costs as a major barrier to integration within the domestic economy. However, the empirical research intends to go beyond this view and introduce other factors

influencing the degree of market integration. Thus, an explorative quantitative research approach based on a theoretical model is applied to study the national market for domestic freight services and the spatial price pattern of a homogenous retail product. The empirical analysis is divided into three levels; a) an analysis of the determinants for domestic freight rates; b) an analysis focusing on identifying the major determinants of the spatial price patterns of one bottle of Beer Lao; and c) an analysis incorporating Lao PDR's geographical location neighboring China.

The empirical findings in the first part confirm that the national road system linking the major provincial centers with Vientiane have been rather successfully upgraded which is in line with the Lao government's strategy to create a land-link between the country's neighbors. The empirical model analyzing the determinants for freight rates between Vientiane and the provincial center show a rather harmonized freight rate structure. However, the findings also indicate that the market for freight services for destinations in the provinces and smaller districts are divided between operators active on different administrative levels. Thus, this division hinders effective transfers of goods and decreases the levels of competition on the market for freight. A regression analysis was conducted to test a set of variables influence on freight rates. The results indicate that road quality and elevation complements distance as main determinants of freight rates on the national market. Moreover, competition was a third factor which was identified as a determinant of freight rates between Vientiane and the provincial centers.

The second part of the empirical analysis focus on the spatial patterns of the retail price of one bottle of Beer Lao. The rationale behind using a domestically manufactured retail product as studied object is that production of this product is not only dependent on the local context where it is consumed. Focusing on a homogenous manufactured retail product manufactured at one single location allows us to abstract from many of these local determinants and concentrate on the impact of transactions costs and market conditions of the studied context. By finding the determinants of the retail price of Beer

Lao it is possible to provide an understanding of why margins in retailing differs between villages. Drawing upon the descriptive analysis, it is possible to identify five principal elements of the market integration based on the analysis of retail prices for beer. These include (1) type of village i.e. rural or urban, (2) access to road, (3) size of the market (number of households in the village, (4) and access to a daily market. The results from the regression models suggest similar results with transport giving a positive impact on the retail price providing higher prices on beer while variables related to market characteristics such as market size and access to a daily market have a negative impact on retail price. The amount of agricultural land in the village was used as a proxy for economic size of the local economy and showed a positive effect on the retail price and can be interpreted as traders in a wealthy village sets the prices to reflect what their customers are willing to pay.

The last part of the dissertation introduces a different geographical and administrative level of analysis by using Lao PDR's geographical location bordering China as factor influencing the degree of domestic market integration in Lao PDR. Trade with China has contributed significantly to the economic development of Lao PDR, but the Chinese influence has looked different in different parts of the country, thus illustrating the geographical patterns of integration with China. The results highlights the fragmented and unevenly distributed growth of expediture in Lao PDR.

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1. Introduction

1.1 Research Background

The focus of this dissertation is market integration at different spatial levels, and particularly, the process of market integration taking place within a country's borders. This process is studied in a country located in a region where programs seeking deeper regional and integration are promoted. Economic integration is a complex balancing act, especially in areas where regional, and even national, economic inequalities are large and where the schemes involve countries at different stages of transition towards market economy. Countries are trying to seek and keep their national identities at the same time as they are expected to actively participate in various forms of regional cooperation in order to meet the challenges and opportunities of globalization and to reduce regional inequalities. This process is also a balance between powerful economic forces outside the region and larger and more developed neighbors within the regional integration schemes.

This is of particular importance for the smallest, poorest and weakest partners in the integration process. Therefore, the smallest and weakest partners are often countries with low levels of domestic integration and ongoing transition processes where the development of the market economy is still incomplete. Geographical factors such as scattered location of urban centers, large distance to markets for remote villages, and low levels of road accessibility for parts of the country naturally have a significant impact on the level of market integration. Access to both soft and hard infrastructure in the forms of transportation and markets are therefore crucial elements of regional as well as domestic integration.

1.2 Research Objective

The purpose of the research project is twofold. Firstly, in spite of the existence of a large number of theoretical contributions on regionalization and integration, there seems to be a weak understanding of how these issues play out in developing countries, where domestic market integration is an additional challenge, In particular, there is no

consensus about how to measure the degree of market integration within a country. The dissertation therefore intends to go beyond traditional integration theory and examines various alternative approaches to market integration by using Lao PDR as an empirical case. Accordingly, theories originating within economics, economic geography, transport economics and logistics will be drawn upon.

Secondly, the dissertation focuses on the market integration process by surveying the spatial price patterns of a homogenous retail product and exploring some of the various market characteristics that determine pricing, the primary one of which is domestic freight rates in a developing country context. The efficiency of the freight sector is one critical component for the successful integration of the local economy into regional and global markets (Banomyong *et al* 2008; Dicken 2003; Goh & Ang 2000; van de Vooren 2004). The performance of the national logistics system is an important facilitator for the export and import trade, but also for domestic distribution (Sadoulet & de Janvry 1995) as the demand for freight transport can be derived from a demand for the goods that are transported (Hesse & Rodrigue 2004).

The main objective of the dissertation is to find determinants for the differences in prices between locations and to quantify the importance of freight tariffs for the final price of the homogenous retail product. Hence, an explorative quantitative research approach will be applied. The main focus will be on the national market for domestic freight services and the spatial price pattern of a homogenous retail product. A conceptual and theoretical framework will be constructed, key actors at different geographical levels will be identified and their roles within the national system for freight will be described. An empirical modeling of the spatial price patterns and freight rates will be developed and tested based on data collected from the private sector.

1.3 Research Problem

The theoretical and methodological frameworks from which to approach the research problem are not straightforward. In order to focus more distinctly on a few

aspects within the larger complex context, the approach here will use domestic market integration as the operative representation of the broader process of integration. It is important to bear in mind that aspects of both economic and political integration both within a country and between countries where regional integration is promoted are closely related and influence the countries' domestic geographical and administrative levels in different ways. Furthermore, the research focuses on the spatial patterns of the price of a homogenous retail product at different locations in the country and its relation to freight transport thus giving primary importance to the performance and efficiency of the freight transport sector.

The research questions are partly of a context specific character, and with focus on the spatial price pattern and the freight transport sector's determination of freight tariffs. However, limited research has been undertaken with regard to the efficiency of the transport service sector and its influence on the degree of market integration in least developed countries. Hence, the broad research question can be formulated as follows:

What factors influence the spatial price patterns of a homogenous retail product in Lao PDR and how do these patterns influence the degree of market integration?

The research focuses on identifying factors influencing differences in price levels based on price data for a homogenous retail product. The characteristics of the product are unique with only a single factory, marketed and available all over the country under a strict regulated distribution network: together with a study of the domestic freight service sector, this provides valuable insights to how the process of market integration in Lao PDR functions.

1.4 Research Questions

In order to operationalize the research problem, four specifying research questions dealing with the process of market integration in Lao PDR have been formulated to help better answer the main research question.

1. *Who are the main actors in the domestic freight transport service sector in Lao PDR, on which administrative and spatial levels do they operate?*

The main objective of the freight transport service sector is to overcome the friction of distance and provide efficient transport services from one geographical location to another. The level of interconnectivity within the transport system is not only dependent on road access and the quality of the physical transport infrastructure but also on the market for freight transport services and the overall demand of freight services from the economy.

A central issue for the present context is the constraints created as a consequence of low levels of quality of the national transport infrastructure. This is an important reason for the traditionally fragmented structure of the national freight transport system. The fragmentation gives importance to local freight service operators and their ability to supply efficient transport services at different spatial levels. The level of coordination and/or competition between freight operators acting at different spatial levels will studied in detail.

2. *How are freight tariffs for domestic freight transport services determined with reference to the geography and regional development of the country?*

Initiatives mainly related to transport infrastructure construction have been promoted by the government in order to achieve better connectivity and to provide access to markets, whereas less attention has been given to how the market for freight service influences the transport costs. Calculation of tariffs for freight services is not only dependent on actual distance transported, quality of the roads and the weight the product, but the structure of the market is also an important determinant. Therefore, it is important to identify factors influencing the determination of freight tariffs at different spatial and administrative levels i.e. national, province, district and village levels. This will provide knowledge about the relationship between road construction and the development of a better integrated national market system and will be analyzed in Chapter 5.

3. *How does the spatial price pattern of the studied homogenous retail product correspond to the costs of freight services to the provincial centers, and which other factors apart from freight tariffs influence the margin between the final price and the freight transport service cost between the national capital Vientiane and the provincial centers ?*

A simplistic view suggest that price differences are dependent on transport costs, but the variation in the pricing pattern is actually substantially larger than the variation in transport costs. The dissertation intend to quantify the margin between the final price and the freight service costs, and relate it to a set of variables collected from the theoretical framework. It is hypothesized that the spatial pattern of price-cost margins will reveal important information about the degree of market integration between the capital and the provincial centers. This research question will mainly be dealt with in Chapter 5.

4. *Which factors specific to the characteristics of villages influence the final price of the homogenous retail product when sold at village level?*

The degree of market integration has strong implications on people's livelihood, as a growing share of the Lao population participates in the local economy by for example selling locally produced products and buying input goods used in the household's agricultural production. By identifying village specific characteristics that influence the final price at the village level, it may be possible to forecast the transmission of price fluctuation stemming not only from events in the national economy but also global developments, like increasing fuel prices.

The research questions follow the sequence of the research conducted; a. understanding the context for freight services, b. developing a model where the relationship between spatial price patterns and freight tariffs are studied, and lastly c. testing and analyzing the empirical data collected.

1.5 Research Methodology

Methodological questions deal with how the researchers choose to define and solve problems by initially choosing different ways of understanding, explaining and predicting the reality of the research object (Arbnor & Bjerke 1997).

1.5.1 Research Approaches

Every academic discipline aims to create new or modify existing theories. Theory development can follow different approaches. Nesher (1999) argues that all three research approaches – deduction, induction and abduction – need to be present in every discipline. To be able to perform an investigation with the purpose to describe and make predictions certain assumptions about reality have to be made. Arbnor & Bjerke (1994), describe three different approaches applicable in business and administration research: the analytical approach, the system approach, and the actor's approach.

This dissertation is based on an analytical approach where the researcher assumes that objective models of reality can be constructed, and where the research objects can be divided and studied at individual levels. The relationships between the different levels of analysis can be built together within a model. Relationships between studied objects in a model are driven by causality. The analytical approach provides conceptual tools that are used for measurement in cases where quantitative methods can be applied (Arbnor & Bjerke 1994; Arbnor & Bjerke 1997).

The dominance of the deductive research is much discussed in logistics research but to a less extent in economics or economic geography (Arbnor & Bjerke 1997; Flint & Mentzer 2000; Mentzer & Flint 1997). The fundamental understanding of the research approach is of importance when developing the path along which the specific research is conducted. Logistics researchers often make the connection between positivism and the use of the deductive research approach (Näslund 2002, Mentzer & Kahn 1995). Deductive research follows the path from theoretical advances to their empirical testing, from general law to a specific case (Alveson & Sköldberg 1994; Johnson 1996); from

rule to case to end of the result (Danermark 2001). Hence, deductive research follows a sequence where the research process start from an established theory or generalization and proceeds to testing whether this generalization applies to the specific empirical setting (Hyde 2000) and fits well with the fundaments of the analytical research approach.

The research conducted in this dissertation can be characterized as deductive, using an analytical research approach. The aim of the research is to identify factors influencing the degree of domestic market integration by using relevant theories, constructing a model for domestic market integration based on the theoretical framework and the contextual study of the freight service sector in Lao PDR, collecting data on freight tariffs and prices of a homogenous retail product, and testing the empirical model in order to draw conclusions from the pattern of market integration in Lao PDR.

1.6 Structure of the Dissertation

The plan of the dissertation is influenced by the definition of integration in terms of finding the rationale to how economic integration between different locations functions. This dissertation consists of eight chapters.

Chapter 1 introduces the purpose of the research, discusses research questions and research objectives, and provides the organization of the dissertation.

Chapter 2 focuses its attention on the relation between trade and regional integration. It presents the neoclassical and the modern views on regional integration with a focus on identification of how transport infrastructure influences trade between regions. The chapter also discusses the difference between market integration and market efficiency. An in-depth survey of transport costs and factors determining transport costs are conducted in order to link regional integration theory with transport economics. Lastly, the chapter highlights the importance of the market characteristics of the freight transportation sector. Concepts like economies of scale, imperfect competition, and

competitiveness are identified as highly relevant when the effects of reduced transport costs in a fragmented national market like Lao PDR are studied.

Chapter 3 discusses the research methodology used in the dissertation. The chapter comment on the methodological foundations and the overall research design. The complexity of the issues studied in this dissertation requires an explorative quantitative research approach.

Chapter 4 describes and analysis regional growth patterns in Lao PDR. The purpose of this chapter is to provide a clear overview of the regional development of Lao PDR during the period 1992 to 2003 by using household survey data. Although the surveys do not include data on provincial or regional GDP, the surveys provide detailed data on consumption expenditure, which are used to proxy regional living standards and development levels. The comprehensive analysis presents the regional development as fragmented with large regional differences in the growth of consumption.

The main purpose of Chapter 5 is to highlight the interacting factors behind differences in tariffs for freight transport between Vientiane and the provincial centers in order to provide answers on research questions number 1 and 2. The structure of the freight system is studied where main actors are identified in order to provide an overview of how the interregional freight service sector functions. The main focus of the chapter is an attempt to analyze the national market freight by identifying and estimating the determinants of freight rates based on the theoretical discussion presented in Chapter 2.

Chapter 6 studies the integration of the domestic market in Lao PRD by using data collected at the village level and seeks to provide answers to research questions 3 and 4. The chapter examines the spatial variation in the price of a homogenous retail product and its relationship with geographical varibles having an impact on transport costs such as location and distance to markets, as well as variables intended to capture factors like economies of scale, imperfect competition, and competitiveness: the exercise is carried out using multiple regression analysis.

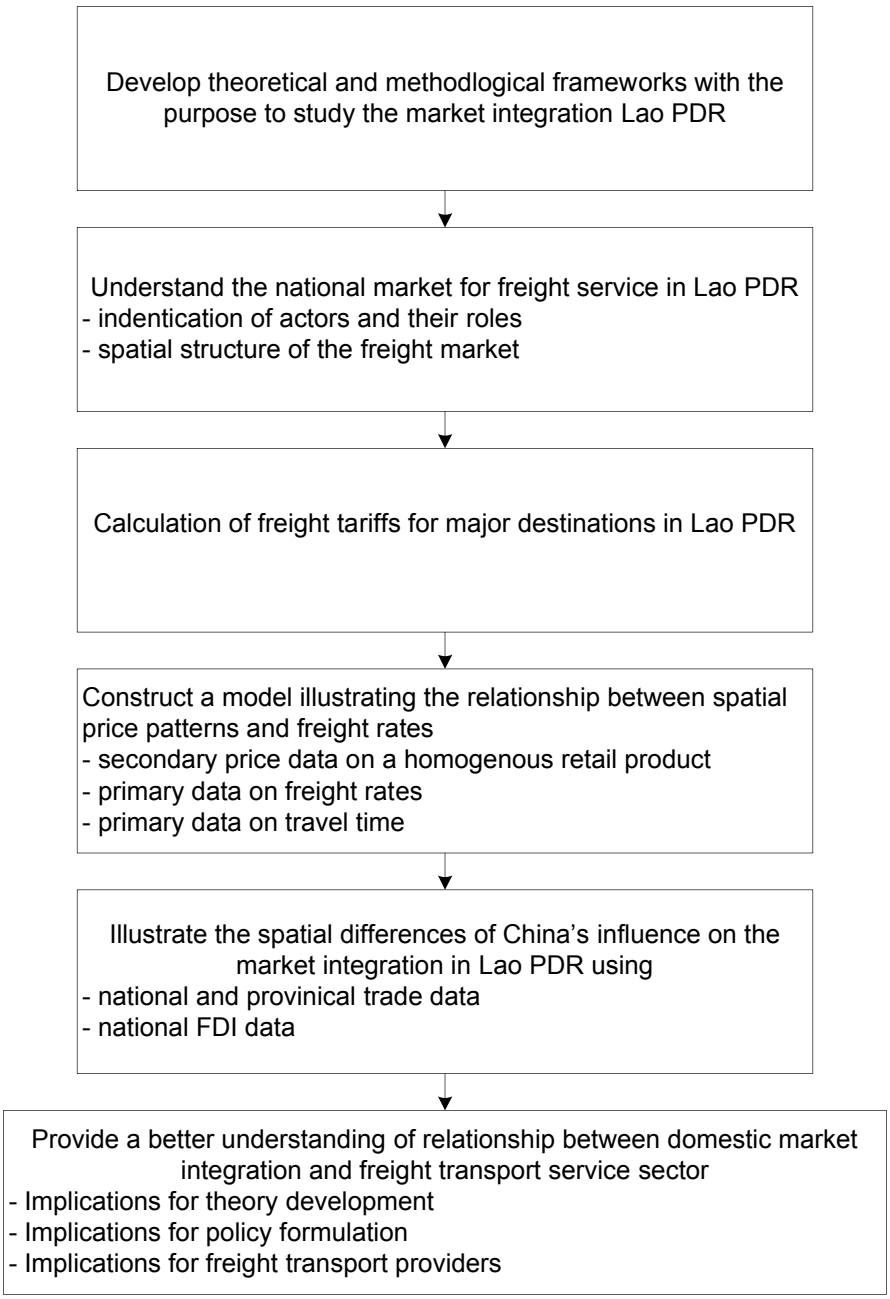
Chapter 7 introduces a different geographical and administraive level of analysis by using Lao PDR's geographical location bordering China as factor influenceing the degree of domestic market integration in Lao PDR. As this chapter illustrates, trade with China has contributed significantly to the economic development of Lao PDR, but the Chinese influence has looked different in different parts of the country, thus illustrating the geoprahical patterns of integration with China.

Chapters 5 and 6 focus entirely on the domestic aspects of market integration and various internal factors influencing the degree of market integration. The geographical level of analysis in Chapter 5 is the national market for freight with special emphasis on freight transport and costs of moving goods between Vientiane and the provincial centers. Chapter 6 focuses on the village level as main the geographical unit of analysis. However, Chapter 7 highlights the fragmented and unevenly distributed growth of expediture in Lao PDR and identifies a regional north – south pattern in growth and development. The particular features of the Lao market mean that the experiences of northern and southern Lao PDR can be used to illustrate two kinds of trade relations with China. The northern part of the country has had ample opportunities to engage in border trade in a wide variety of products, thanks to relatively low entry barriers in terms of transport and transactions costs. Southern Lao PDR, by contrast, has faced higher costs in its trade with China, which has limited the range of products that can be exported and imported. If the first of these cases is described as "integration", the second one illustrates "internationalization" and its impact on the "domestic integration".

Chapter 8 summarizes the results of the study and presents some conclusions on the nature of market integration in Lao PDR.

Figure 1.1 illustrates the simplified sequence of the research conducted in the dissertation (a more detailed overview of the research process is provided in Chapter 3).

Figure 1.1 Sequence of the Research Conducted in the Dissertation



2. Theoretical Framework

2.1 Introduction

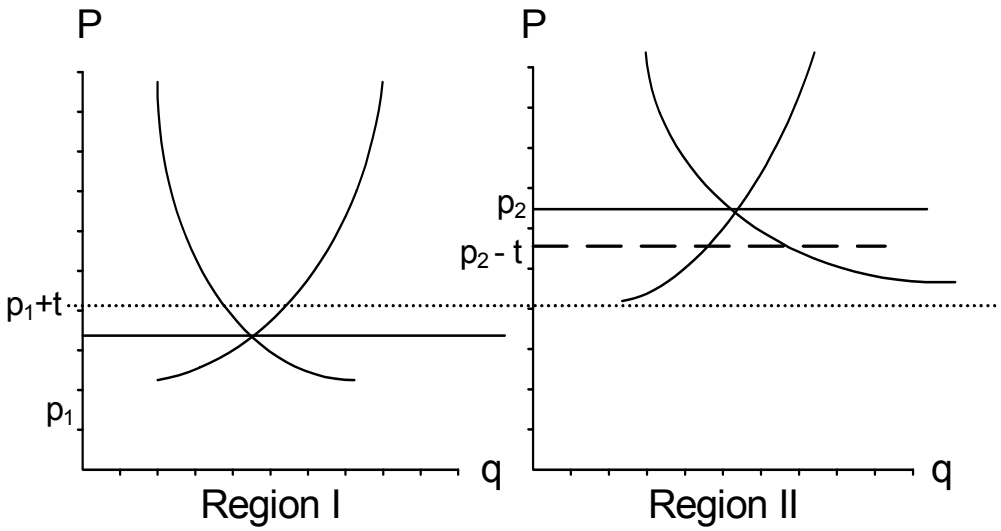
This chapter identifies and discusses the effects of economic integration and the importance of transport costs in explaining the location of economic activities, presents the neoclassical view of how transport infrastructure influences trade between regions, and introduces the concept market integration. It discusses the complexity of the determinants to transport costs and how the market for transport services matters for the final transport costs for freight. The theoretical framework used for this dissertation utilizes a set of different theories in order to develop a suitable model for analyzing market integration in conjunction with the freight transport service sector.

The differences between these ideas are related to the spatial dimension in market integration and, in particular, the lack of an explicit discussion of spatial issues in most of the analysis based on the neoclassical view. The study does not intend to provide a complete picture of all the likely effects economic integration arrangements have on the economy. Such a description would need to be based upon a broad number of theoretical areas, and would be of little use for the aim of this dissertation. Since the present study is based upon a field study of spatial price patterns of a homogenous retail product and freight rates, the focus is primarily on identifying and describing the theoretical linkages between market integration, transport economics and marketing channels.

The aim of the present chapter is twofold. First, the chapter aims at presenting a macro framework based on traditional theories of trade, regional integration together with a discussion of the difference between market integration and market efficiency. This framework highlights the importance of trade costs for economic growth and development. Then the chapter introduces the importance of transport costs by describing and analyzing these costs based on the demand and supply for transport. This theoretical analysis is thus concerned with the relationship between trade costs, spatial market integration, transport and the market for freight transport services.

The second aim of this chapter is to describe the complex relationship between transport costs and the market for transport services by using theories from marketing channels. This part focuses on the complex relationship within the market for freight transport services and this complexity's influence on determination of transport costs.

Figure 2.1 Trade based on difference in supply and demand between two locations Region I and Region II



Source: Based on Rietveld P. & Nijkamp P. (2000: 211)

Figure 2.1 illustrates the standard neoclassical model of interregional trade and the impact of transport costs on trade volumes. In autarky, Region I exhibit lower prices for good X than Region II, because of lower production costs – in other words, Region I has comparative advantages in production of X. Whether trade will occur, and how large the traded volumes will be, depends on the efficiency of the transport system and the transport costs. If the transport costs exceed the difference in price between regions ($p_2 - p_1$), there will be no trade: taking into account the transport costs, imported goods will be more expensive than domestically produced goods. A reduction in transport costs will stimulate trade between the two regions. For example, if transport costs fall to the level

illustrated by ($t - p_1$), goods from Region I will appear attractive in the market of Region II. Consumers in Region II will wish to import good X, while producers in Region I will be interested in exporting good X. Equilibrium occurs when the import demand from Region II is just equal to the export supply from Region I. The equilibrium prices in both markets also change. In the importing region, the price falls, but never below ($p_1 + t$); since it is the lowest possible import price including transport costs. In the exporting market, the price increases, but never above ($p_2 - t$), which is the highest revenue that an - exporter will be able to get from a foreign customer. The new international price will end up somewhere between these two extremes, depending on the supply and demand conditions in the two countries. If transport costs are reduced even more, the scope for international trade increases.

2.2 Regional Integration Theory

This simple analysis only hints at the overall effects of reduced transport costs: the static and partial character of the analysis is mainly able to show that the country or region with comparative advantages is able to increase its output, while the country or region with comparative disadvantages can reduce production of the good in question and focus resources on other activities.

A more comprehensive picture of the effects of improved efficiency in transport systems can be gleaned from theories on regional integration. These theories usually focus on other issues than transport costs – the key elements of most regional integration agreements are reductions in formal and informal trade barriers between the member countries – but the outcomes are often discussed in terms of reduced trade costs: from an analytical perspective, it can be argued that it does not matter much whether the reduction in trade costs emanates from lower transport costs or lower man-made trade barriers.

The theory of regional integration has passed through two phases: a neoclassical stage, which is based on comparative static effects (and in principle reflects the

discussion above) and a more sophisticated stage that draws on insights from modern trade theory and focuses on dynamic effects.

2.2.1 The Neoclassical Analysis of Regional Integration

The neoclassical analysis of the effects of regional integration focused on two phenomena: trade creation and trade diversion (Viner 1953, Lipsey 1957; 1961). Trade creation was said to occur when the introduction of regional trade preferences allowed firms in one of the partner countries to capture market shares held by local firms in another partner country. Since this replaced a relatively inefficient producer (that had benefited from import protection) with a more efficient producer, it was expected that it would on balance improve welfare, both regionally and globally. Regional consumers would benefit from lower prices, and the producer surplus gained in the expanding industry would exceed the producer surplus lost in the contracting industry; at the same time, the rest of the world would not be affected.

Trade diversion, by contrast, was often expected to reduce both regional and global welfare. Trade diversion occurs when regional trade preferences allow firms from one of the partner countries to capture regional market shares that were earlier held by outside producers. The reason for expecting negative effects in this case is that more efficient producers are displaced by less efficient ones. To get into the market in the first place, when all foreign producers faced the same trade barriers, the outsiders must have been relatively efficient compared with the domestic producers. Hence, outsiders lose when their market shares diminish, and welfare losses in the integrating region itself are also likely, in spite of lower consumer prices and increased regional production: tariff revenue shrink when imports from the rest of the world fall, offsetting the gains in consumer and producer surplus.

However, over time, it has been recognised that the welfare impact of trade diversion may in some cases be beneficial to the integrating region. These situations occur when the substitution possibilities in consumption and/or production are relatively

large, and the cost disadvantages of regional producers (as compared to the most efficient outsiders) are relatively small. If the establishment of a regional integration agreement improves the terms-of-trade of the integrating region, it is even possible that a trade distorting customs union could raise the welfare of the integrating region above that the free trade (Markusen *et al.* 1995). Moreover, as pointed out by Kemp & Wan (1976), it is always possible to define a set of tariffs and subsidies to compensate outsiders, so that the global welfare effects of any customs union – even one with trade diversion – are positive.

However, whether the main impact of regional integration was thought to be trade creation or trade diversion, the welfare effects found in the quantitative assessments were typically very small – often less than one percent of GDP. One reason for the limited quantitative impact of this kind of neoclassical integration is that most regional agreements were between similar countries, where the potential gains from trade creation are relatively small. The members in most regional agreements exhibited similar factor price ratios and industry structures, whereas theory predicted large effects mainly when agreements included countries with widely different comparative advantages.

The neoclassical analysis of integration acknowledge that trade creation and trade diversion result in expansion in some parts of the integrating region and contradiction in other parts, but the determinants of this restructuring process are not very complicated. In the neoclassical world, the pattern of comparative advantage is large driven by factor endowments of each economy. These are believed not to be manipulated in the short term and therefore viewed as more static. Hence, when regional trade barriers are removed, factor price differences will automatically direct trade and/or investments to the appropriate part of the region (Lipsey 1968).

To conclude, the main contribution of the neoclassical integration theory is the systematic exposition of various forms of economic integration by highlighting the importance of the removal of institutional barriers to trade.

2.2.2 The Modern Analysis of Regional Integration

The modern analysis of regional integration is largely based on the assumptions that economies of scale are important and that reductions in formal tariffs are rarely sufficient to achieve true market integration – remaining non-tariff barriers to trade can lead to effective fragmentation of markets even when formal tariffs are very low. The assumption about increasing returns to scale is crucial in modern trade theory, and essentially means that most autarky markets will be characterised by imperfect competition. The smaller the market, the smaller the number of competitors, and the higher the price level. The reduction in trade costs that follows from regional integration is important, because it raises market size, and results both in better opportunities to exploit economies of scale and in an increase in the level of competition. This will reduce the price level, to the benefit of both producers and consumers. The benefits to consumers from lower prices are obvious, but producers also benefit. Unlike in the neoclassical analysis, there is an increase in external competitiveness (thanks to tougher competition and economies of scale), which benefits both import competing firms and firms exporting to third countries. This increase in external competitiveness appears to be an important motive for costly regional integration. For instance, the European Single Market project arguably emerged as a response to tough competition from the US and Japan in industries with significant economies of scale. As long as Europe was fragmented into a large number of more or less insulated national markets, it was obvious that the leading American and Japanese producers would be larger and more competitive than the typical European producers (see Cecchini 1988).

The introduction of scale economies and imperfect competition also results in dynamic benefits from integration. While the benefits in the neoclassical model were thought of as one-time improvements in resource allocation, modern theories stress the existence of cumulative benefits. Larger firms that operate in more competitive markets do not only have a static advantage, but also an ability to grow faster over time. This dynamic advantage is mainly related to the ability of larger firms to take on larger fixed

costs for R&D, which is expected to result in faster innovation, both in the form of new products and more productive technologies.

To achieve these dynamic benefits, it is necessary to go beyond simple integration agreements like preferential trade agreements or free trade agreements, and focus on more complex integration, such as common markets or even currency unions, where producers in the different member countries compete under the same set of institutional rules and restrictions. While the neoclassical model of regional integration is clearly applicable for the analysis of the effects of reductions in transport costs – since simple integration agreements can often be proxied as reductions in trade costs – it is relevant to ask whether modern theories can also be used for the same purpose. The complex institutional changes that follow from sophisticated integration agreements like the European Single Market can hardly by captured by a simple one-dimensional measure such as a reduction in trade or transport costs. However, as long as the analysis focuses on the reduction of transport costs within a single country, it can be argued that it is appropriate to draw on modern theories. The formal institutional environment, including not only laws and regulations but also the currency regime, is already harmonised, and the reduction in transport costs mainly serves to make the relevant market larger.

The modern integration theory emphasises concepts such as economies of scale, imperfect competition but also acknowledges distance and other geographical factors to a higher extent than the neoclassical integration theory, which largely ignore space and location. This shortage of earlier research is highlighted by Frankel (1997), who notes that the neoclassical integration theory does not attempt to explain the geography of trade such as the source or destination, but rather focuses on the total trade of a country. He argues in favour of making geography, a part of trade theory for three reasons; distance between a pair of countries is an important natural determinant of the volume of trade between them; and countries that are located close together constitute a natural trading bloc, by which he mean that a reduction in the trade barriers between them can be economically beneficial.

Concepts like economies of scale, imperfect competition, and competitiveness are all highly relevant when the effects of reduced transport costs in a fragmented national market like Lao PDR are studied.

While the broad macro framework for the present study – which is based on theories of trade and regional integration – highlights the importance of trade costs for economic growth and development and identifies some of the expected effects of reduced trade costs, it leaves one important area unexplored: the market for transport services. The changes in trade costs (including transport costs) are treated as exogenous events or policy variables, and little is said about why and how transport costs vary between locations or change over time. A more thorough understanding of the role of transport costs therefore requires a careful analysis of the market for transport services.

The remainder of this chapter will therefore focus on two issues. First, to bridge the conceptual distance between the theories of regional integration discussed above, which deal with interactions between countries, and the focus area of this dissertation, which concerns interactions between regions in one country, the reminder of this chapter will discuss the relation between market integration and development in some detail. Thereafter, the chapter focus on a theoretical and conceptual discussion of the market for transport services, freight channels with a particular attention on the determinants of transport costs.

2.3 Spatial Market Integration

Spatial market integration is defined as the extent to which demand and supply shocks arising in one location are transmitted to other locations within a market rather than the broader scope regional integration discussed above (Fackler 1996; McNew 1996; McNew & Fackler 1997; Fackler & Goodwin, 2001). The spatial market integration theory borrows its theoretical foundation from the modern integration theory as its focus dynamic effects of integration. Observing direct flows of traded products between two spatially distinct markets is a sufficient but not necessary condition for some degree of

spatial market integration (Barrett & Li 2002). Direct trade linkages between regions are not necessary for spatial integration because if regions belong to a common trading network then price changes may be transmitted indirectly through the trading network (Fackler & Goodwin 2001).

Markets that are not well integrated may transmit inaccurate price information that distorts marketing decisions and contributes to inefficient product movements (Goodwin & Schroeder 1991). Within a completely integrated market, the price of a homogenous goods will converge, and the economic law of one price will hold: competition will drive down consumer prices to production cost plus necessary transaction costs.

The efficiency of the market system is important for sales of industrial goods, but also for sales of handicrafts produced by local households, and for the households' ability to access consumer products at local markets (Sadoulet & de Janvry 1995). Efficient distribution systems with low transaction costs are expected to transfer goods produced elsewhere to the local consumer at a competitive price, at the same time as local producers can get a competitive price for their commodities (Carter & Ferrin 1995; Pelton *et al* 2002). Geographical factors such as location, distance to markets, and road accessibility naturally have a significant impact on the costs of intermediate and final goods (Christaller 1933; Hoover 1948; Berry 1967; Gramlich 1994). This means that transaction costs – including trade costs, transport costs and costs for retrieving information about prices and market conditions – can have a direct effect on households' opportunities to increase their income by participating in the market economy (Arrow 1969; Wen 1997; Gannon & Liu 1997; Banister & Berechman 2001).

This is of special relevance in countries where large parts of the population are involved in agricultural production based on self-sufficiency and where production within individual households determines the levels of consumption (Ali & Pernia 2003; Deaton 1997). Self-sufficiency and isolation are seldom voluntary phenomena, but rather

consequences of poor transportation infrastructures and high transport costs (Ahmed and Rustagi 1984).

Market integration has usually been conceived in terms of the co-movements or long-run relationship between spatial price patterns (Fackler 1996). However, market integration is neither necessary nor sufficient for market efficiency, so that tests for integration do not always generate correct inference regarding spatial market efficiency (Fackler 1996; McNew 1996; McNew & Fackler 1997; Fackler & Goodwin 2001; Barrett & Li 2002). It is often argued that the conventional methods assume stationary spatial marketing margins, stationary transfer costs, and/or that markets are linked by a constant trade pattern for example in a distribution system of a specific product. However, these assumptions are often violated and so the resulting test of market integration can be misleading and have adverse consequences on policy decisions.

The development of a model testing market integration for markets of a particular commodity represents one attempt to make the distinction between market integration and market efficiency. When data on prices, transfer costs and trade flows are simultaneously available, a test for the degree of market integration can be conducted (Deaton 1988). In cases where it has been used to analyze the effects of marketing policy changes on spatial market efficiency, the effect of policy changes is assumed to take time to be implemented. This is explained by the assumption that it may take some time for the traders to learn and understand new marketing policy changes, assess its implications for reorganizing their businesses, make new investment and disinvestment decisions, and to access resources required to make the necessary adjustments in response to policy changes.

Knowledge of the time path of effects of market reform on spatial market efficiency would be very useful for properly assessing the effects of marketing policy changes, and for designing marketing policies, institutions and marketing and transport infrastructure (Fafchamps & Gavian 1996). Thus, there is a need to improve and extend the standard methods for testing market integration so that it allows for gradual transition

between spatial market efficiency states as a result of changes in the policy environment, and to develop a test of whether structural changes in spatial market efficiency are statistically significant. However, this implies access to time series data on transfer costs which are rarely available, particularly in developing countries. As a result, most empirical studies have assumed transaction costs are equal to a constant plus a serially uncorrelated error for a given marketing policy regime (Sexton *et al*. 1991; Fafchamps & Gavian 1996; Baulch 1997; Barrett & Li 2002; Penzhorn & Arndt 2002).

However, this assumption is very restrictive, particularly when the objective is to analyze the effects of policy changes including changes improving the transport system. This is because if transaction costs are assumed to be equal to a constant plus a serially uncorrelated error when they actually fluctuate systematically over time, then the models may misinterpret spatial price changes as evidence of inefficiency when they are actually just a rational response to changes in transaction costs. Thus, there is a need to go beyond the conventional constant transaction cost assumptions and find better ways of using data that are available to construct more appropriate inferences about historical movements in transaction costs including changes in the market for freight transport services.

Moreover, an improved market situation reduces the width of price bands (Sadoulet & de Janvry 1995; Badiane & Shively 1998) and households are able to increase the diversification of income earning activities and interact at markets in order to sell oversupply and access necessary input goods. Binswanger *et al.* (1989) highlight imperfect markets with high transaction costs and identify the following conditions to have relevance for the degree if market integration:

- Geographically scattered population with low population density.
- High transportation costs as a consequence to lack of transportation infrastructure.
- Seasonal rainfall causing seasonal demand for agricultural labor

• Simple technologies without significant economies of scale

2.3.2 Differences between Market Integration and Market Effeciency

In spatial price analysis, the terms market efficiency and market integration are very widely used and sometime the terms are used interchangeably. However, there has been a growing recognition that these two terms are related but not equivalent, and that there is a need to distinguish between them (Fackler 1996; McNew 1996; McNew & Fackler 1997; Fackler & Goodwin 2001; Barrett & Li 2002). Market efficiency is an equilibrium condition whereby all potential profitable spatial arbitrage opportunities are exploited. Spatial efficiency is reached when the optimal amount of trade in a particularly product between two or more geographical locations takes place. This optimality condition requires difference in price between two location to be less than or equal to transaction costs. If there is no trade, a spatial price differential less than transactions cost is also consistent with spatial market efficiency. However, if the spatial price differential is greater than transaction costs, the market is inefficient either with or without trade.

2.4 Transport Costs

Until the 1960s, transport costs were seen as one of the main factors explaining the location of economic activities. This view lost some of its importance during the early 1970s, mainly related to two reasons. Firstly, a number of empirical studies during the 1960s and early 1970s showed that there was no simple relationship between transport investments and development. In some cases improved transport to peripheral regions even led to the closure of economic activities due to increased competition from imports (see e.g., the discussion in Hilling 1996). Secondly, patterns of industrial location changed. As a result, regional development and later internationalization and globalization came to be seen as processes influencing the location of large multinational corporations (Massey & Meegan 1979; Fröbel *et al.* 1980). Even if low transport costs were recognized as a prerequisite for the process of dispersion of production facilities that ensued, it was generally assumed that transport costs were (and would remain) so

low that they no longer had any importance for the location of production – instead access to cheap labor and input goods gained importance, and agglomeration became an increasingly important location determinant (Bairoch 1988).

Dicken (2003) discusses the decreasing importance of distance from a historical perspective, as a result of improved transportation technologies, but does not go further in explaining the underlying links between economic development, improved transport infrastructure, and reduced costs of transport services. The discussion about the diminishing importance of transport costs reveals a number of problems. First, the average per unit costs of transportation of a certain distance has been reduced, but overall transport costs have generally not decreased, because the amount and length of transport used in production processes have increased as rapidly as the unit costs have decreased (Dicken 2003). Thus in spite of reduced unit transport costs for a given freight distance, the size of the transport sector as a share of GDP has generally not decreased (Baldwin & Martin 1999 and Hummels 2007).

Secondly, although unit costs of transport and communication have decreased, the reduction is not uniform across all types of commodities and consignments, all types of communication, and all origins and destinations (Gallup *et al* 1999). In fact, transport and communication costs depend increasingly on the availability of infrastructure and the density of demand for specific links (Combes & Lafourcade 2001). Here, developing countries – in particular, poor landlocked countries– face particular problems in connecting to the international transport network (Venables 2001).

Thirdly, although international trade and production have grown rapidly and products are increasingly transported around the world, the percentage of the work force even in industrialized countries producing directly for a non-local market has only changed marginally during the last hundred years. Merchandise production has become more and more efficient and employs a decreasing share of the work force. Therefore, even if transport costs related to production of specific goods have fallen, their share of the total production costs may not have (Hummels 2007). It also means that the local

production environment and production for the local market remain important in spite of globalization.

Fourthly, the current trend towards globalization implies an externalization of production and service functions that used to be performed in-house, and a regrouping of enterprises at a larger national, international or global scale. As a result, transport costs have often become more difficult to trace because they are part of intra-firm transactions or hidden in aggregated payments to suppliers and subcontractors. However, more importantly, internal transport, communication, and storage costs have become partly substitutable with external transport and communication services. Enterprises no longer attempt to minimize their external transport and communication costs. Instead they try to minimize their total logistic costs, including the costs of both internal and external transports, storage, and transaction costs, covering the costs of both internal and external communication of negotiating contracts and favors with other enterprises and public authorities. These costs are often much larger than the external transport and communication costs.

The possibility of substitution between internal and external logistic costs increases the importance of the local and regional production environment, comprising both private production and service enterprises and public infrastructures and services, which can help to increase efficiency. Therefore transport costs rarely seen as an isolated element, as they were in the old location theories, but rather as an integral part of the dispersed production process. At the same time, the different modes of transport must be seen as related to each other as links in a transport chain – of which other services such as storage, packaging, forwarding, trade finance and insurance may also be part. Thus, the effect of a transport investment cannot be studied at the level of the individual investment. To understand the effect of transport on economic development one must focus on the transport system as a whole and the way it is integrated into the processes of production, distribution and consumption.

In this much broader perspective transport is now attaining new importance as a factor structuring economic development (Evans & Harrigan 2005). For instance, access to more efficient transportation and logistics services can facilitate changes in both the composition of trade and the destination of trade flows. This can be illustrated with reference to the location decisions in e.g. the textile industry. Initially, production was concentrated either to the main markets or the sources of raw materials. Over time, access to cheaper and faster transportation services facilitated specialization and outsourcing of production to locations with low wage costs. However, shorter product life cycles and demand for shorter transport times have began to outweigh the advantages provided by lower wage costs, leading to relocation of production facilities. Evans & Harrigan (2005) give some examples of apparel production outsourced from the United States to Asia that has relocated to higher wage locations in the Caribbean and Mexico; similarly, Eastern European apparel producers have recently been able to win market shares from East Asian producers, in spite of higher labor costs Short production cycles and more uncertain demand for the products can also be motives for agglomeration as firms need to locate near suppliers (Harrigan & Venables 2006).

An important observation in this context is that cost reductions in the transport sector are not only driven by technical progress, but also by government intervention. Deregulation, liberalization, and infrastructure investment are examples of public interventions that are likely to influence the level of competition in the market for transport services. Increased competition, in turn, can be an important driving force for reductions in transport costs. An illustration of this is the deregulation of international air traffic, which has not only led to the emergence of new low-costs carriers, but also forced incumbent carriers to reduce their prices.

In recent years, there have been an increasing frequency and importance of interactions between markets at all spatial levels, from local to global as described above. Efficient transport systems are crucial in order to overcome the friction of distance as enterprises expand in order to enter new markets on all spatial levels. There have also

been an increase in the importance of national and international production networks, where production units are geographically separated from each other, located at different places, in order to exploit differences in production costs and make use of the specific comparative advantages of each region or country. Reliable and efficient communications networks together with well functioning distribution systems are essential for the operation of these global production networks, which arguably constitute the essence of our modern global complex economic system (Nijkamp *et al.* 1990). Countries with well developed markets where institutions and actors interact with relatively high efficiency have been the main objects of study in extant academic literature (see for example Aschauer 1989a, b; Munnell 1990 and 1992; Gramlich 1994 on issues related to infrastructure investments and productivity and Bowersox *et al.* 2000; Button 1993; Hoyle & Knowles 1993; Ligt & Wever 1998 for research related to transport and logistics).

Efficient market systems with low transaction costs are able to transfer goods and services to the final consumers at a low price. Weakly developed economies with a large share of the population living in rural areas often suffer from low levels of access not only to the global markets, but also to domestic services such hospitals, schools and markets due to insufficient transport networks (Warr 2005).

Academic literature provides a number of indications of a renewed interest in the relationship between transport and development. It is evident in the increased focus on geography, space and agglomeration economies in new economic geography, growth, and international trade theories (Brakman 2003 and Krugman 1997), and in the increased focus on trade and services in studies of local as well as global development. But maybe it is most evident in more recent attempts to establish links between transport and economic development at the macro level in studies of globalization (Janelle & Beuthe 1997) and in studies of the long development cycles which are sometimes explained in terms of shifts in sources of energy and means of transportation (see e.g. Rodrigue *et al.* 1997). However, these different approaches generally stop short of studying the

increasing integration between transport, production, and distribution taking place in the globalizing economy.

2.4.1 The Standard View of Transport Costs

In the most simplistic neoclassical theories of economics, the transportation sector is largely non-existent. The simplest models abstract from geography and space, and the actors in the market are assumed to interact without the friction caused by distance: the neoclassical economy can be thought of as a "point economy" where all economic activity takes place at the same point in space. However, the importance of geography has gradually been recognized even in mainstream economics literature (with *New Economic Geography*, represented e.g. by Nobel laureate Paul Krugman, as a particularly important area of research). Specific models for analyzing the transportation sector have also emerged. The purpose of this section is to describe the neoclassical perspective on the market for transportation, in particular transport demand and transport supply.

Similar to other partial equilibrium models, the simplest models for the transport sector identify a limited number of factors that are expected to influence the demand for any particular type of transportation, e.g. truck deliveries, and another set of factors that influence the supply of that specific kind of transportation. For example, Button (1993: 90) uses the following equation to illustrate transport demand:

$$Q_d = f(P_1, P_2, \ldots, P_n, Y, T)$$

Here, Q_d, which is the quantity of transport demanded in the market, is a function of the transport price (P_1), the prices of substitutes and complements ($P_2,...,P_n$), income (Y), and taste or preferences (T). This equation essentially treats transport as a homogeneous good and not as a bundle of services. A more sophisticated view of the market for transports would recognise that a transport system consists of a wide variety of services that are differentiated in terms of mode of transport, time and place. In his more complex setting, transport demand is not only a function of the price but also dependent

on time, access to the transport service, quality measures, reliability and competition on the market for transportation services.

Transport supply is typically expressed in terms of the capacity of transport infrastructure and transport modes within a spatially defined transport system during a specific period of time. Transport supply can be divided into the infrastructure (measured by capacity), services (frequency) and networks. The mass of freight transported per unit of time and space is commonly used to quantify transport supply. The set of variables influencing transport supply differs between different modes of transportation. For road and rail transport, supply is often dependent on the capacity of the routes and vehicles utilized in the process: this is called modal supply. Modal supply occurs when one mode influences the supply of other modes, or when several modes compete for the same infrastructure. By contrast, for air and maritime transport, supply is strongly influenced by the capacity of terminals, such as airports and ports. These modes are strongly dependent on transhipment capacity, and therefore described as intermodal.

The market for transport services is complex and there are several considerations to made when analysing the relationship between transport demand and transport supply:

- Entry costs. These are the fixed costs associated with the initial investment during construction of transport infrastructure and rolling stock and the variable costs arising during the operation of transport services such as maintenance, labour and fuel. These costs serve as thresholds for entry on the market for transportation services (Banister & Berechman 2001). Entry costs differs between modes of transport, with maritime, rail and air transport recording very high entry costs. The trucking sector has an advantage as entry costs are lower and trucking companies can adapt to changes in the demand for transport services. High entry costs imply that transport service providers will consider fluctuations in demand seriously before expanding by increasing their fleet or investing in new infrastructure. In situations with lower entry costs, transport service providers are able to respond more rapidly to fluctuations in demand: new firms are able to

enter when demand is high, while incumbents may leave without substantial losses if demand falls rapidly. This is in sharp contrast to the situation with high entry costs, when it may be equally rare to see new entrants as incumbents that leave the market. As a result, markets with high entry costs tend to be oligopolistic, while transport services with low entry costs tend to have more operators and higher competition.

- Regulation and public sector involvement. Transport markets are heavily dependent on public sector investments in infrastructure. The provision of transport infrastructure, especially roads, has commonly been the responsibility of governments (Taaffe *et al*. 1996). As a consequence, transport costs are often fully or partly financed by the government, and governments therefore control the use of the resource through various types of regulations. The government is also responsible for maintenance and in many developing countries transport infrastructure is one of the larger expenses for the government.

- Elasticity of demand. Refers to the variation of demand in response to a variation of the cost. Variations in transport costs have different consequences for different transport modes, although transport demand has a tendency to be inelastic (Hoyle & Knowles 1998). For users of transport services engaged in production of goods where freight costs are a small component of the total production costs (i.e. where the value/freight cost ratio is high), variations in transport costs have a limited effect on the demand for the final good, and hence for transport demand. Conversely, for goods with low value/freight cost ratios, demand elasticities tend to be relatively high. Moreover, industries where timely deliveries of input are crucial can be very sensitive to the quality of transport services: production delays caused by transport problems can be very costly. For these industries, it is common that the price elasticity of demand is low, although the "quality elasticity" may be very high.

2.4.2 Transportation Services as Facilitator of Economic Development

Historically, the development of transportation networks has reflected and induced settlement, industrialization, and urbanization. An idealized sequence of transportation development includes (1) scattered ports, (2) penetration lines, (3) development of feeders, (4) beginnings of interconnection, (5) complete interconnection, (6) emergence of high priority routes (Button 1993). Spatial interaction is the movement of goods between areas, countries, cities, and even places within cities. Transport improvements have resulted in convergence between cost space and between time and space.

Various studies have provided empirical evidence on the relationship between socioeconomic development and road transportation. Poverty is more pervasive in areas with no or unreliable road access (Gibson & Rozelle 2003). For example, in Nepal, there is a considerable difference in poverty between areas not connected by roads, where 70 percent are poor, and the national average rate of poverty, which is 42 percent. (Lebo & Schelling 2001). In Bangladesh, enrollment of girls in primary schools is three times higher in connected villages compared to unconnected areas (ibid). In Andhra Pradesh, India, the female literacy rate is 13 percent higher in villages with access to all weather roads compared to villages with limited road access (Gannon & Liu 1997). As these figures indicate, one of the major causes of poverty is geographical isolation. Improving the access and mobility of the isolated poor might provide opportunities to decrease poverty by increased access to markets and public services (IFAD 2001). With better access to transportation, previously isolated population groups can break away from their involuntary isolation and forced self-sufficiency, and increase their welfare by participating in market exchanges (Jacoby 2000). Lower transportation costs will be beneficial both because they will contribute to lower prices for those goods that are imported from other locations, and because they may rise the prices of the goods that can be produced locally (Hine & Riverson 1982).

In a broader context, these same forces can serve to raise the welfare of countries that become more integrated with their neighbors or with the world economy. Regional integration tends to reduce trade costs and facilitates the separation of production from consumption by reducing costs of market distortions induced by national policies. This means that the underlying comparative advantages can play a greater role, which may result in increased agglomeration (Tamura 1996). However, if transaction costs become small, then differences in costs across locations become less important, and the factor cost considerations of the neo-classical model becomes more important.

Road transport costs in developing countries are generally high. Rizet and Hine (1993) found in a comparison between Pakistan and three Francophone African countries that road transport costs in the African countries were 4–6 times higher than in Pakistan. The large difference was both related to African input costs that were much higher and African productivity that was much lower than in Pakistan. Although there are probably large differences in the productivity of the trucking industry among different African countries, it seems generally to remain poor. Trucks seldom drive more than 25,000 km and return freight is rare, both of which have a strong influence on the final price. There are a number of structural reasons for low productivity: the highly seasonal nature of the demand for transport, the generally low population and production density, general insecurity which makes night driving an exception in many countries, and the widespread use of old second-hand trucks, which need frequent repair.

A recurrent complaint of the trucking industry in many developing countries has been the poor maintenance of the roads, which leads to high accident rates and high costs of vehicle operation and maintenance. However, the poor maintenance standard has to a large extent been due to a rapid deterioration of roads caused by the inability (or unwillingness) of many governments to enforce axle load regulations (Fepke 1996).

A major change in the conditions for the trucking industry in many developing countries therefore has been the decision of the governments to strictly enforce axle load

regulation, (though hard pressed by the donors involved financing road construction, which made this a precondition for further support to road rehabilitation). Although enforcement of the axle load regulation reduce payload and led to increased transport rates, it also increase the travel speed (which with the heavy overloads were often very low) and reduced the vehicle maintenance costs and road maintenance costs.

However, high transport costs are not just due to structural factors, but often also to poor management and a non-competitive market (Hine 1982). One of the reasons for the limited development of the trucking industry in developing countries has been that freight service operators have been under state ownership and large private industries generally operated their own in-house fleet of trucks. In the freight service sector this served to limit the development of an independent domestic trucking industry and reduced the productivity of transport: generally it is more difficult for in-house transport to secure return freight and utilize vehicles outside the peak periods than it is for a transport company serving several customers (Bonnafour 1993). In agriculturally related transport with large seasonality this has been problematic (Dawson & Dey 2002).

As a result, the independent trucking industry in developing countries was developed primarily to serve the transit traffic between the ports and the landlocked countries (McCormick & Pedersen 1999; Banomyong 2000; 2004). However, since the mid-1990s increased competition due to trade liberalization has been changing this pattern rapidly. Many large manufacturing enterprises are now selling their trucks and outsourcing their transport services to specialized transport firms. Interestingly Alokan (1995) draws the opposite conclusion from Africa, where Nigeria went through structural adjustment that was associated with a restriction of imports and therefore had a different impact than in Eastern and Southern Africa. While transport to a large extent was outsourced during the oil boom in the 1970s (and the early 1980s when the economy was based on heavy borrowing) when it was easy to import, structural adjustment in Nigeria led to a more inward looking economy and also an increase in in-house transportation.

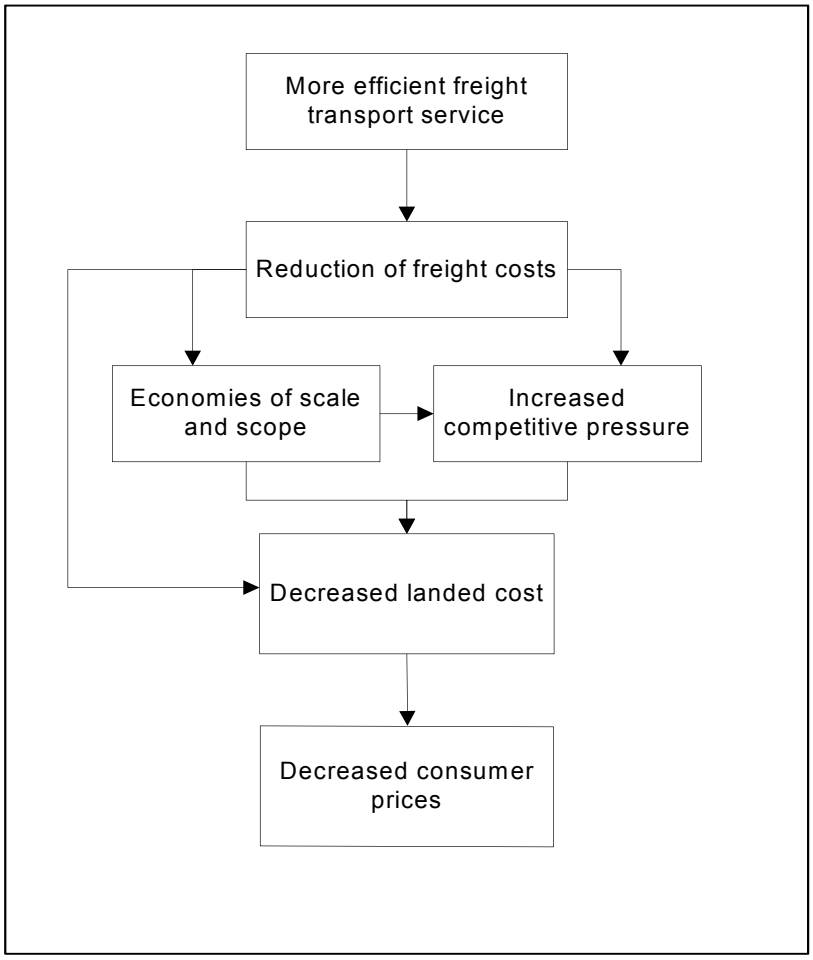
2.5 Freight Transport

Emerging markets that are dominated by a self-sufficiency economy based on production of agricultural products give room for households to manage the exchange and distribution of goods without the involvement of specialized firms providing logistics services such as transportation, packaging, and storing. Connectivity to markets is a starting point for the development of a marketing system and the process can provide interesting insight to how the markets function before intensive integration with external (international) markets has taken place. Exchange relationships in marketing and freight channels often relate to firm to firm relationships to solve the end consumers' final demand which can be illustrated by intermodal transport when several transport modes are used for transport activity.

In the context of emerging markets, there might be scope for focusing at the household level and the household's interaction with markets when studying and estimating the efficiency of freight channels and how well markets mechanisms function to connect demand and supply. The basic approach would be to use locally produced goods such as agricultural products such as rice, consumer goods such as beer with one domestic manufacturer and imported goods and estimate the transaction from the point of entry on the market until it reaches the final consumer.

Mapping the evolution of freight channels in an emerging market can contribute both to the understanding of how efficiency of markets mechanisms can be measured and how these measures can be applied in other contexts where market mechanisms are under development. The focus in the academic research related to freight channels is on developed economies where there is a well developed institutional framework to govern markets by rules and regulations, where the exchange of information is transparent and where there is well developed infrastructure to support the physical distribution of the products.

Figure 2.2 Effects of Efficiency Gains in the Freight Sector and Redistribution Effects from Interregional Trade



Source: Based on Rietveld P. and Nijkamp P. (2000: 212) and Engström (2004: 5)

Figure 2.2 captures the earlier discussion linking the relationships between increased interregional trade, decreasing transport costs and the importance of an efficient freight sector. According to Figure 2.2 decreased transport costs will have three effects. Firstly, a direct effect on the landed cost which will decrease as a consequence to lower freight costs.

However there are two indirect effects which also influence the landed costs. The economies of scale and scope will be expanded as the manufacturing industry. Recalling the theoretical discussion about trade costs in section 2.1 where interregional trade is depended on the price difference between the trading regions. If trade costs in one region decrease then the scope for exporting goods from this region will increase. Figure 2.2 link the discussion about increased competitive pressure within the transport service with the increased competition between manufactures which at last results in lower consumer prices.

The following section discusses the organization and management of freight transport channels in general. There are three different foundations of management and organization of the freight transport channels. The foundations include power, trust and commitment, and market setting. The latter is used in those channels where no pronounced leadership exists. The firms might, in this case, be of equal size. The first two bases, power and trust and commitment are to be seen as two extreme foundations. When power determines how the organization and management issues in the freight transport channel are dealt with, there is one dominating actor setting the rules for how the channel should be operated. The different bases for exerting power typically result in many firms involved having some degree of power. In the other extreme, where trust and commitment is the base, decisions, organizations, and management of the channel are taken to a certain degree in consultation between the involved actors. Between these two extremes, we find the market-based solutions in which a combination of the extremes is used in forming the freight transport channel. In a context with low levels of transport and communication technology, trust becomes of large importance as exchange of information can be hard and time consuming.

2.5.1 Channel Concepts

There are numerous channel concepts and the following presentation is aimed at presenting the key concepts related to marketing, distribution, freight, logistics channels and supply chains (Weitz & Wensley 2003). A theoretical framework can be developed

from the extensive literature relating to channels with a simple definition for marketing channels as *"the group of channel members to which a set of distribution tasks has been allocated"* (Rosenbloom 2004: 21). The evaluation of theory on channel structure emerge from emphasize on the length of the channel to the study of the intensity and functional responsibility within the channel (Ibid; Robicheaux & Coleman 1994; Stern *et al.,* 1996).

The distribution channel refers to the actual movement of goods providing time, place and possession utilities (Bucklin 1966). Stern & Heskett's (1969) definition focuses on the different actors in the channel: *"A channel of distribution shall be considered to comprise a set of institutions which perform all of the activities (functions) utilized to move a product and its title from production to consumption."*

Later on, end-user requirements and channel members resources were introduced in the analysis of the structure but still focus was on the dimension of channel length (Bucklin 1966). Functional specialization and its implication for time usage and cost effectiveness were applied by Mallen (1973) by introducing the business function's purpose to minimize total distribution costs. Sharma & Dominguez (1992) take this development a step further and propose a relationship between macroeconomic factors and channel length. They argue that a nation's economic development and typical channel length varies as long the nation's economic development. Channels are often longer during early stage of the development but shorten as the economy grows as a consequence to increased efficiency. Sharma & Dominguez (1992) proposed a framework for analyzing channel evolution via a comprehensive model for analyzing the environmental forces that affect channel length. Their explanatory variables included economic development; adherence to culturally entrenched shopping behaviour, management style, government intervention and the degree of urbanization. Samiee (1993) proposed similar variables for studying distribution structures in developing economies. The evolution towards shorter channels may be explained by two phenomena: (i) as the economy further develops and becomes more service oriented, there is less of a

need for indirect channels; (ii) the growth of urban centers encourages vertical integration in channels in order to improve efficiency.

The present study focuses on the market integration of a homogenous retail product, the physical flow of the specific product and the determinants of freight tariffs in the Lao freight transport service sector. In the much broader concepts distribution and marketing channels include actors which are not only involved in the physical distribution for example by providing coordination of the services, perform loading and unloading or stock taking. Therefore this dissertation narrows the scope of freight transport channels to define the concept as a set of interdependent organizations involved the dynamic process of moving a product towards the location of consumption.

2.5.2 Determinants of Freight Tariffs

Freight tariffs can be categorized as a combination of terminal costs and line-haul costs. Terminal costs are fixed costs and are incurred regardless of distance involved. Line-haul costs are variable costs that are related to transport distance, road conditions and level of maintenance. Specific freight tariffs are determined by two sets of factors. The first set of factors relates to the nature of the commodity and include following variables:

1. loading and packaging costs;
2. vulnerability to loss or damage;
3. shipment size;
4. regularity of movement;
5. special equipment and services and;
6. elasticity of demand, where elasticity of demand is the degree of responsiveness of a good or service to changes in its price.

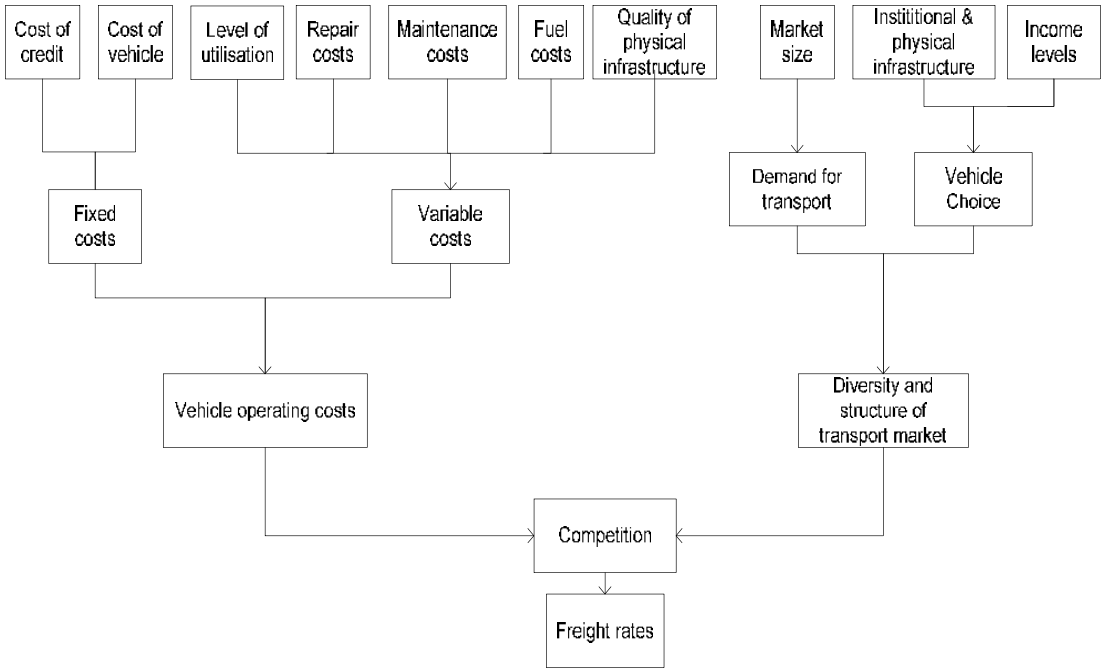
The second set of factors relates to the characteristics of the market for freight transport operators and the routes which include:

1. carrier competition;
2. route demand and;
3. backhauling.

Transport rates are also affected by the nature of the policies governing the mode of transport. For example, shipping is characterized by market orientated principles while aviation traditionally has been based on government intervention and strong regulations. Transportation costs are of crucial importance for industries that are raw material seekers and market seekers, but less important for industries dealing in materials and final products that are of very high value in relation to their weight. This dissertation is concerned with the role of transportation as a facilitator of the demand for an increasingly integrated national market in Lao PDR.

An important point to note in connection with the efforts to improve transport infrastructure is that just roads are not sufficient to generate further growth and integration (Dawson and Barwell 1993). A road in itself is not a sufficient condition for socio-economic development and economic growth, but rather a necessary condition, in the sense that the road makes up one part of the enabling environment. Ellis and Hine (1995) argue that decreasing transport costs are also dependent on Vehicle Operation Costs (VOC) and the level of competition on the transport market.

Figure 2.3 Determinants of a Transport Tariff



Source: Adopted from Ellis and Hine (1995)

In order to understand the structure of the freight system in a national transport system, it is important to identify the components affecting the size of the transport tariffs. Figure 2.3 sets out a basic framework linking the major features of the market to the final tariff. The left side deals with vehicle operating costs and those factors that affect fixed and variable costs. The right hand side of Figure 2.3 deals with the operating environment of the transport service providers, including factors related to market structure such competition and market size. A component such as availability of credit can influence both sides of the model as cost of credit directly influences the vehicle operating costs but also the choice of vehicle. These components are grouped under institutional infrastructure and include the degree of regulation in the market and the back up infrastructure serving reparation and sale of vehicles.

Vehicle Operating Costs are divided into fixed and variable costs. Fixed costs are a function of the price of credit and vehicle price where the lower cost of vehicles and credit influence the fixed costs to be lower.

Variable costs are a function of repair costs, maintenance costs, level of utilization, fuel costs and the quality of the physical infrastructure i.e. road quality and road coverage. Limao & Venables (2000) show that poor infrastructure accounts for more than 40 percent of predicted transport costs. The higher the quality of the road infrastructure, the lower the costs that is needed to be devoted to reparation, maintenance and fuel will be. However, these factors also have a direct impact on variable costs. Changes in either fixed or variable costs will obviously influence total costs, and may also affect he final transport tariff. How closely underlying costs are reflected in the final tariff depends on market conditions and competition.

Competition is perhaps the main factor influencing the efficiency of transport service providers. If price-cost margins are reduced by the entry of lower-cost competitors, this forces incumbent transport service operators to increase utilization and employ more efficient operating practices to ensure survival on the market. One of the determinants of the level of competition is the number of operators and the number and diversity of vehicles. Also the local conditions, such as the business environment and the openness of the local economy at the origin of the transport service provider, have an impact on the level of competition. This is especially important in the context of an economy in transition towards a market economy (Leinbach 2000).

Transport demand at large is determined by the size of the market. In rural areas, demand is related to population density and the intensity of agricultural production. Vehicle choice is affected by the type and quality of physical and institutional infrastructure, the vehicle backup service available, and the income level. Physical infrastructure affects the type of vehicles operating, for example, during the wet season or in mountainous terrain, where there may be a need for better trucks which higher capacity.

Institutional infrastructure influence the way policy makers promote the use of certain modes of transport. Institutional infrastructure also encompasses the availability of credit, and provision of markets. Vehicle back up services are related to the availability and quality of mechanics, repair facilities and the availability of spare parts. Section 2.5.2 discussed the market for transportation. Here, a more focused discussion of the determinants for road freight tariffs is conducted. Instead of distinguishing between supply and demand side determinants, the relevant literature typically distinguishes between the effects of VOH and market conditions.

2.6 Summary and Conclusions

The previous theoretical sections have been included for a particular purpose – they all serve to reflect and discuss the effects of economic integration and the importance of transport costs in explaining the location of economic activities by presenting the neoclassical and the modern views of how trade costs such as transport infrastructure influences trade between regions. Reduction in artificial trade barriers have implied that the relative importance of transport costs as a determinant of trade has increased (Amjadi & Yeats 1995).

The chapter focuses on the creation of economic interaction between countries and regions. Regional integration leads to increased economic activity between member countries due to the reduction of transaction costs, including not only customs duties and other regulatory barriers to the movement of goods, services and factors of production, but also transportation costs. As a result, the economies of the participating countries will be stimulated and may increase their growth rates. This is the positive effect from increased economic interaction. The negative effects from regional integration can occur in the form of new or higher tariffs and quotas on goods from third countries (countries outside the agreement), which leads to trade distortion. The individual country may not be able to set individual quotas or tariffs against countries outside the agreement. In these cases some products may become very expensive, which benefits producers located inside the agreement, and this may result in a welfare loss. Domestic producers who were

not able to compete with the producers outside the agreement will get an advantage and protection because of the expanded market (the area of economic integration).

An important conclusion of the theoretical discussion about regional integration is that transportation costs can be used to reflect barriers to market integration on a domestic spatial level as illustrated in Figure 2.1. Integration of a domestic market is rarely hindered by customs duties or other regulatory barriers to the movement of goods thus giving high priority to transport costs. The theoretical discussion about transport costs and its determinants hold a crucial importance for domestic market integration. This chapter highlights the importance of transport costs and market characteristics of the freight transport sector. Economies of scale, imperfect competition, and competitiveness within the freight transport sector are highly relevant for the level of domestic market integration.

3. Research Design and Methods

Within the particular context of this dissertation, exploring market integration thus necessitates both a well defined empirical setting and a research design to manage the challenges and complexity of the studied process. The main objective with this dissertation is to find determinants for the differences in prices between locations and quantify the importance of freight tariffs for the final price of the homogenous retail product in Lao PDR. The main focus will be on the national market for domestic freight services and the spatial price pattern of a homogenous retail product.

3.1 The Empirical Setting

This dissertation seeks to understand how the domestic market integration functions and in particular how the levels of market integration relates to Lao PDR's markets for freight services. Hence, an explorative quantitative research approach will be applied. The dissertation is explorative in the sense that it is not clearly given to what extent transport costs influence the domestic market integration. The dissertation seeks to shed light not only upon the relationship between market integration and freight transport costs in Lao PDR; it will also investigate the underlying variables influencing the costs of transport within the freight transport service sector.

The choice of empirical setting is introduced in Chapter 4. Lao PDR provides an unique setting as a country with very large regional differences in economic growth and in access to transport infrastructure. Hence, its fragmented national market has been argued to come from the low levels of transport infrastructure development (Bourdet 2000). The pattern of large disparities in economic development between provinces and regions has been targeted by government policies but is still persistent.

As identified in Chapter 2 the relationship between market integration and transport costs is of large importance. In order to investigate this complex relationship there is a need to study the underlying variables influencing the cost of freight transport

in order to get a better picture of how the market for freight is constructed and to identify factors determining the price of freight transport.

3.2 Research Approach and Methods

Research methods consist of systematic tools and techniques to make and interpret empirical observations (Vafidis 2002). However, research methods are instruments with specific fundamental ontological and epistemological assumptions with separate ways of influencing the studied objects (Solem 2003). As the choice of methods is not purely a technical question, but also a reflection of the researcher's beliefs and ideals, its dissemination is of importance. Traditionally, quantitative methods have been associated with a positivistic or deductive approach (Näslund 2002), while qualitative methods are often linked to inductive research paradigms (Mentzer & Flint 1997). However, these distinctions are not absolute. In fact, a variety of different research approaches can be used for the empirical testing phase of deductive research. These range from quantitative methods including model building, simulations, and statistical analysis (Halldorsson & Aastrup 2003) to qualitative structured interviews (Hyde 2000) or triangulation, which is a combination of multiple research methods (Denzin 1970; Denzin and Lincoln 1998; Ellram 1996; Yin 1994).

3.2.1 Triangulation

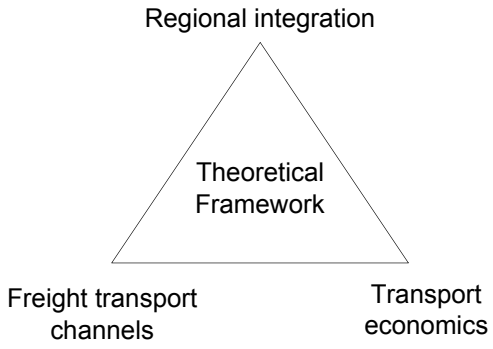
The method employed for this research is triangulation because of the complexity of the research questions and the context in which the research takes place. Yin (2003) suggest a quantitative research method in order to answer research questions seeking to know more about which, what and how many. Denzin (1970) identified four basic types of triangulation:

- *Data triangulation:* involves time, space, and persons;
- *Investigator triangulation:* consisting of the use of multiple, rather than single observers;

- *Theory triangulation:* involves using more than one theory in the interpretation of the phenomenon studied;
- *Methodological triangulation:* involves using more than one method to gather data.

The theoretical foundations on which market integration and the formation freight tariffs have their origins suggest a number of different variables influencing the degree of integration of domestic markets. In order to ease the understanding of the issue at hand and interpreting the complexity within the system studied, this dissertation applies a theoretical framework drawing on several existing theories. Figure 3.1 provides a summarizing illustration of the triangulation of the theories used in the dissertation.

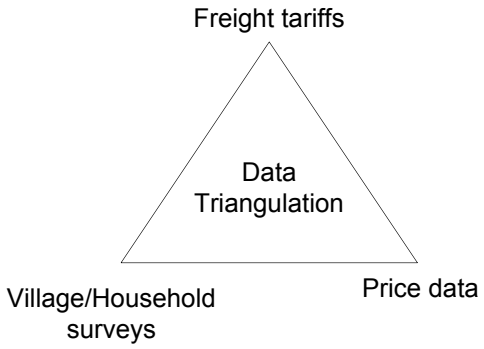
Figure 3.1 Triangulation of Theory Transport Economics –Regional Integration – Freight Transport Channels



In order to fully interpret the freight service sector and the process of market integration, it is also necessary to use multiple data sources. Data on spatial price pattern for a homogenous retail product and freight tariffs are two of the most important data series used. These data originate from secondary sources (data collected as part of a larger a household survey) but include also primary data on freight tariffs and information about the method of calculating freight tariffs collected during semi-structured interviews with stakeholders in the freight service sector. By using several

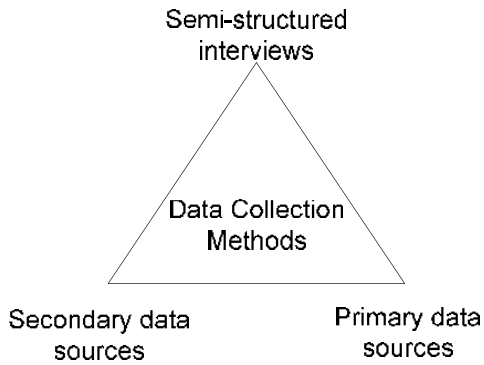
sources of data the author is able to increase the reliability by cross-checking different data sources (Denzin 1989).

Figure 3.2 Data Triangulation



Data triangulation as shown in Figure 3.2 can achieve higher validity particular when conducting quantitative research in a context, such as in a developing country, where the availability and/or the reliability of data are low or when the research conducted makes use of confidential and sensitive information, such as prices and rates.

Figure 3.3 Methodological Triangulation



Methodological triangulation involves using more than one method to gather data. Figure 3.3 illustrate three different methods to gather data is used, semi-structured interviews for the collection of freight data, usage of secondary data from a household survey implies methodological triangulation together with primary data sources.

3.3 Data Sources

It is important to consider the data availability when developing a model. Naturally, it is of limited use to develop a model just to find that there is no data of satisfactory quality to use as input in the model. Data sources can be of two well known types; primary data sources and secondary data sources. There is a limited secondary data sources available for parts studied context whereas other parts are well covered by earlier secondary data. As the main purpose of this dissertation is to conduct an explorative study combining several theoretical dimensions there is a need to be flexible and use several types of data giving use of data triangulation. The theoretical framework together with the structure and sequence of the research imply utilisation of a variety of data sources, both primary and secondary.

3.3.1 Secondary Data

In order to ease the problem associated with collecting and conducting research with in the research setting and the studied phenomena of market integration and the freight transport service sector. The research setting which is investigated and studied in Chapter 4 where a quantitative data is utilized to measure, study and analyse the provincial disparities in economic growth. The role of the dataset and the quantitative analysis is to provide a well grounded setting and illustrating how fragmented regional development Lao PDR experience. Data to calculate poverty rates were complied from the household surveys LECS 1, 2, and 3. The datasets was provided by Department of Statistics (formerly the National Statistics Centre) and a more detailed presentation of the components used will be presented in respectively analysis. The poverty rates calculated from the household surveys were used for the mapping of the regional and provincial

development in Chapter 4. The geographical data used to construct statistical maps was provided by the National Geographical Department. Although the household surveys were conducted before the Special Administrative Region Xaysomboune was integrated into the province of Vientiane it was decided to follow the present administrative division.

Data on transport development presented in Chapter 5 was obtained from United Nation Economic Commission for Asia and Pacific (UNESCAP) Asian Highway Database and made available in electronic format by the Transport Division at UNESCAP. Ministry of Public Works and Transport (MPWT) provided secondary data on transport development through its National Transport Committee.

Chapter 6 use LECS 3 with a special focus on the data collected and compiled on the village level (for detailed information on LECS 3 see Appendix 4). The village level data consists of 540 villages. The village survey contains information on the development level of the village with a large number of variables collected. While LECS 3 provides a unique and valuable source of information for analysis it should be noted that there are some weaknesses in the dataset. One problem is that the coverage and stratification of the LECS samples has changed over time, which means that it is difficult to construct data panels on basis of the three existing surveys. This creates problems over time to follow developments and change over time at a disaggregate level. This is exacerbated by the scarcity of reliable information on variables like production, growth and structural change from other sources. Given the focus on spatial price patterns on retail commodities it would be highly valuable to access price data from all three surveys. However, only LECS 3 contain a full sample of prices collected on village level giving the reason for the usage of only LECS 3 in the analysis in Chapter 6. However, the dataset used to conduct the statistical analysis was constructed by variables related village characteristics and prices collected from LECS3 whereas variables related to travel time was provided by the Swiss National Centre of Competence in Research (NCCR) North- South. NCCR shared

data on travel time from their Socio-Economic Atlas of the Lao PDR (Messerli *et al.* 2008).

The last empirical chapter combines foreign trade statistics with official trade statistics collected by Lao authorities. The official trade statistics collected by Lao authorities do not provide any accurate description of the structure of imports and exports. There are two main national sources of trade statistics in Lao PDR, the customs administration collects export and import data at each border crossing Lao authorities and data collected on provincial level the Provincial Department of Import and Export which monitor value, volume together with destination and origin of the export and import. This data started to be reported to the Department of Import and Export at the Ministry of Industry and Commerce during 2006.

The problems with data availability is connected to the weak capacity of the statistical authorities in Lao PDR and the high share of informal trade, which is partly facilitated (or caused) by an inefficient customs administration. The fact that much trade if informal makes it difficult to double-check the Lao export records by examining import data from the country's trade partners: the lack of formal export and import records spills over to the trade statistics of the neighboring countries. Hence, there are substantial discrepancies between the export data recorded by the Department of Import and Export and data provided by the customs administration at the Ministry of Finance (see e.g. IMF 2000) and the import data registered by the trade partners of Lao PDR. These discrepancies do not follow any systematic pattern – some years, partner data show much lower trade volumes than official Lao records, other years the opposite is true.

Therefore the main sources of data for this chapter are the IMF's Direction of Trade Statistics (DOTS) and UN Comtrade[1], which presents official statistics provided by

[1] The data on imports by most of the trade partners of Lao PDR are recorded in the UN Comtrade database. Lao PDR is not included as a reporter in Comtrade because of problems with data availability and quality

national authorities and/or statistics derived from partner records. The main reason for the decision to make use of the IMF statistics is the frequent updating of data and the relatively short time lags; and the fact that statistics provided by other sources are usually solely based on national official data, whereas the IMF conducts crosschecks and adjustments, e.g. by making use of partner data.

3.4 Qualitative Research on Freight Transport Service

The proceeding section will discuss following issues occurring in relation to methodology used in Chapter 5. This section focuses its attention on the complexity occurring when collecting primary data from the freight transport service sector. Moreover the present section defines the population of interest for the study of the freight transport service sector, defining the sampling unit, the size of the sample together with the sampling method.

Casavant *et al*. (1995) stress three distinctive aspects why it may be difficult to collect data for a study of freight transport services. First, the identification of the actor (operator) who actually makes commodity shipping and service decisions is not always straight forward (in the passengers case the identification is clear). Second, most of the relevant variables used to describe goods movements are very different from those used to describe passenger flows (weight/volume of a shipment, distance transported, annual tonnage transported, value of commodity, potential risk involved in the movement of the goods and ownership of the transported good). In addition to these factors it is often difficult to find the right person with the correct knowledge of the whole freight channel willing to be interviewed. Finally, different service provider's knowledge and perceptions about the characteristics and attributes of various transport modes may be significantly different from objective measures of the level of service properties. In the case of freight transport, the knowledge of the level of service offered by a mode not being used by the shipper is rather limited compared to the passenger counterpart as the operators focus on their mode and its rare to see intermodal transport solution from domestic transport in developing countries (Garrido 2000). For instance, in the passengers case, commuters

have relatively accurate knowledge of travel time, cost and comfort for all the available modes, whereas in the freight sector, the shipper would need to actually use the available alternatives to find out the level of service attributes, which may result in large unwanted costs.

Daughety (1979) also emphasises the concept of total distribution logistics of a firm, when freight transport is analysed and measured. Thus, shipment decisions and service characteristics should be analysed beyond the transport function, i.e. imbedded in the context of the total transport supply environment, including interactions between routes, inventory, vertical integration and other strategies of the companies participating in the corresponding supply chain. The latter is equivalent to the consideration of activities instead of simply trips as in the passenger's transport case. Daughety (1997) and Garrido & Mahmassani (2000) provide general recommendations with regard to data collection from the freight transport service sector, which are of interest to this study. In many studies, there is a need for surveys aiming to understand the nature of shippers, carriers and facilitator's behaviour, together with the collection of formal quantitative data on freight rates. Surveys of service providers, carriers and facilitators usually involve personal interviews with a knowledgeable set of respondents (Hancock 2000). The interviewers should be specialists in freight transport since they will probably use semi-structured interviews with the interviewees.

3.4.1 Sampling Frame, Population, Unit and Size

The purpose of Chapter 5 is to highlight interacting factors behind differences in tariffs for freight transport between Vientiane and the provincial centers. It is important to note that this section relates to research design used in Chapter 5. Chapter 5 is divided into two parts in order provide a well grounded study of the freight system in Lao PDR. Part 1 utilize qualitative research methods to analyse and identify stakeholders and actors of the Lao national freight system and with a quantitative second part trying to identify and quantify determinants of freight tariffs. The choice of using both quantitative and qualitative research methods to study the freight system is related to the above discussion

about the complexity of a national freight system. For example Daughety (1979) highlight the importance of understanding how actors within the freight system interact. Therefore multiple research methods facilitate the understanding of this complex research objects.

The sampling frame of the qualitative study in Chapter 5 is designed to cover a wide range of actors and stakeholders within the national freight system. The sample units are defined as stakeholders in the freight transport sector in Lao PDR and persons with special knowledge about freight transport in Lao PDR. Firms involved in freight transport service in between Vientiane and the provincial centers, freight transport service providers located in Bokeo Province and Savannakhet Province, customers using freight transport service in Vientiane, government regulators on four administrative levels; national, provincial, district and municipality levels, experts in academia and international organisations, and government officials from neighboring Thailand. The size of the sample is 69 respondents (see APPENDIX 1 List of Interviews - List of Interviewees Consulted for Study of Lao Freight Sector in Chapter 5)

3.4.2 Sampling Method

A critical stage in the sampling process is the choice of method used to choose sample units. Chapter 5 use stakeholders in the freight transport sector in Lao PDR). The study in Chapter 5 uses a non-probability sampling. The type of non-probability sampling use is purposive with the researcher selects the sample units based on background knowledge. The sample units were selected together with National Transport Committee at Lao Ministry of Public Works and Transport (MPWT).

3.4.3 Data Collection Process

The collection process has been divided into several phases and has been based on interviews with key stakeholders and actors within the Lao freight transport industry.

The data collection process in Lao PDR benefited by using semi-structured interviews and more importantly by consultation meetings arranged by the Lao Ministry of Public Works and Transport and the Swedish Embassy in Vientiane.

The interviews laid a foundation of knowledge about the context which was necessary when holding consultation meetings with the key stakeholders in the freight sector. The consultation meetings was arranged with the assistance of MPWT and provided an opportunity to utilize data triangulation technique by gather data from policymakers, service providers and local shipper and consignees. Most of the respondents were high ranking official or business owner. Here local language was used to ease the understanding and the discussions between the respondents. The depth of the discussion was facilitated by the respondents' knowledge and experience from working within the freight sector.

Freight surveys should recognise that quantitative data may be difficult to obtain due to their commercial value. On the other hand, qualitative data elicited from expert panels might be an initial way of understanding freight transport processes. However, in during the consultation meetings it was hard to access quantitative data from the service providers as they were reluctant to reveal data related to freight tariffs and the composition of their costs. Therefore it was very important to during the consultations identify person with specific knowledge with a possibility to be quantified.

A key issue for the analysis is the identification of the population of interest. The identification of key stakeholders was made during the consultation meetings. The identification was made and more importantly a relationship with the respondents can be established. In a context where access to information can be difficult and the interviewer need to gain trust from the respondents. This is particular true with government officials who need be very careful when providing data or offering their perspective. Therefore consultation meetings might not be enough to gain full understanding of the studied context. Considering the sensitive nature of the researched context, interviews of government officials, so-called "elite" interviews, were highly significant for

understanding the context and roles and the functions of different actors in the freight sector. Interviews of this kind are based on lists of themes or key issues rather than set of questions. With little or no direction from the interviewer, respondents are encouraged to relate their experiences to describe whatever seems significant to them, to provide their own definition of situations, and to reveal their opinion and attitudes as they see fit. The interviewer has a great deal of freedom to probe various areas and to raise specific queries during the course of the interview. This means that the same broad topics will be introduced during each interview but the questions may change over time. Although the encounter between the interviewer and respondent is structured and the major aspects of the study are explained, respondents are given considerable liberty in expressing their definition of a situation that is presented to them.

The next step in the data collection process involved close interaction with key stake holders on a more occasional basis by attending meetings and conference in Lao PDR and Thailand. Lindberg (2007) stress that as a researcher working with government officials has to gain basic knowledge it is useful to spend time in the government departments. This give knowledge of how things work, the decisions are taken, the politics of power thus giving important information about how the government exercise its power. Lao PDR are often referred to as difficult context to conduct research in. Lindberg (2007) provide an example from the Lao Ministry of Industry and Commerce where the researcher was given trade statistics published by the Asian Development Bank instead of getting access to national statistics. This shortcoming was avoid during the data collection process by regular visits to ministries and by frequent participation in national and regional meetings covering the topic of trade statistics, transport development and the regionalisation process in the Greater Mekong Subregion. The level of trust between the researcher and the responsible government officials grew and there were no problems in accessing data. As a matter of fact both the Ministry of Industry and Commerce and the Ministry of Public Works and Transport were very helpful in providing data and organising meetings inside the government sector but also with private sector stakeholders.

3.5 Data Analysis Methods

Data analysis techniques vary depending upon the underlying research objectives and research questions which are specified under each chapter.

3.5.1 Regression Analysis

Regression analysis has been used in many studies to determine whether infrastructure developments influence the economic development of a geographical area (Deaton 1997; van de Vooren 2004). Also, this methodology has been used in several studies to determine the composition of factors influencing the efficiency of a specific transport infrastructure project or a mode of transport.

In order to determine the relationship between price and factors influencing the collected prices it would be necessary to compare different geographical locations, especially as the studied context consists of fragmented markets with limited connectivity. The degree of market integration has strong implications on people's livelihood. By identifying village specific characteristics that influence the final price of a homogenous retails product at the village level, it may be possible to forecast the transmission of price fluctuation stemming not only from events in the national economy but also global developments, like increasing fuel prices.

In regression analysis, an initial theoretical hypothesis is made in which a factor or factors (independent variables) have an impact on the factor of interest, the dependent variable (Lewis-Beck 1980). A multiple regression implies more than one independent variable. Data on all variables are collected, and commonly a least square fit is performed. Statistical parameters from this initial analysis then indicate if there is a statistically significant association between each separate independent variable and the dependent variable, together with an indication of the nature of this relationship, as indicated by the regression coefficient. It should be noted that regression analysis is a statistical method to determine relationships between given variables, but does not

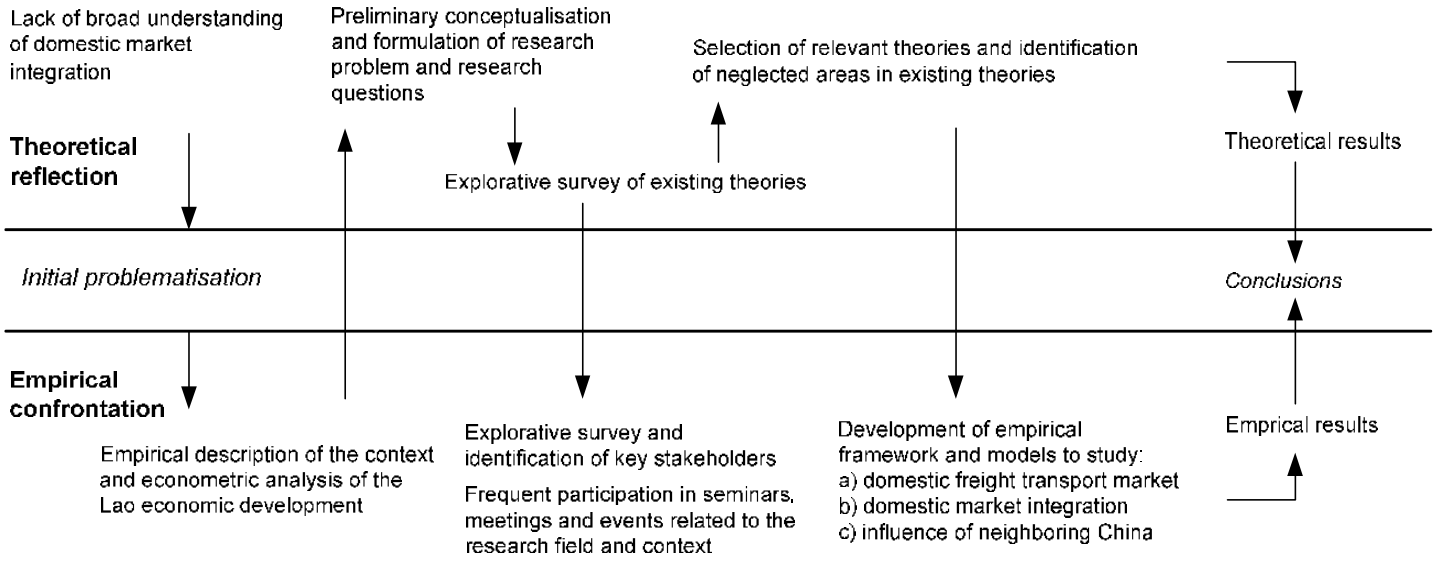
necessarily imply that the independent factors caused the dependent factor to respond the way it did. However, causality has to be postulated in the theoretical framework and in the original definition of the variables used in the analysis (Shaw & Wheeler 2000).

3.6 Summary and Conclusions

In introducing the empirical context, research design and methods and the main statistical method, this chapter has sought to combine the conceptual and explorative theoretical discussions in Chapter 2. Figure 3.4 provide an overview of the research process which highlights the importance of interaction between the theoretical reflections and the empirical confrontation. The path which the research follows is dually dependent on the development of the theoretical reflections and continues advancement of the empirical knowledge of the research setting.

The chapter can, therefore be seen as a starting point for the subsequent chapters. The idea has been to give the reader a road map by which to understand and interpret the empirical data presented in Chapters 4, 5, 6 and 7. It is import to note that this chapter provide an overview of the methods used in the dissertation. Each individual chapter provide more detailed discussion and presentation of the methods used in the specific studies.

Figure 3.4 Research Process



Source: Author´s elaboration based on Lindberg 2007

4. Regional Economic Growth Patterns

4.1 Introduction

The purpose of this chapter is to measure, study and analyse the provincial disparities in economic growth in order to provide an overview of the regional disparities.

There is a lack of reliable indicators for studying trends and levels in provincial and regional economies in Lao PRD. However, the geographic pattern of economic growth can to some extent be studied using the national Living Standard and Expenditure Surveys collected by the Department for Statistics. Three household surveys have been conducted, in 1992/93, 1997/98, and 2002/03, which enables some comparisons of developments during the two five year periods covered by the surveys[2]. Although the surveys do not include data on provincial or regional GDP, they provide detailed data on consumption expenditure, which can be used to proxy regional and provincial living standards and development levels.

4.2 Regional and Provincial Consumption Growth Patterns

Table 4.1 summarizes data on the changes in per capita consumption across the three living standard surveys, and shows that there has been a large variation in consumption growth across regions in Lao PDR. When studying the full ten year period, it is clear that rural households have fared relatively well in the North, the South and Vientiane. Economic development in the Central region has been less encouraging. Including urban households as well, the pattern is less clear and the differences between regions are smaller.

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[2] A fourth survey LECS 4 was conducted 2007/08 however this survey lacks detailed price data from villages and therefore not covered in this dissertation.

Table 4.1 Regional Yearly Growth Rates of Per Capita Consumption

	All Households		*Rural Households*	
	92/93-97/98	*97/98-02/03*	*92/93-97/98*	*97/98-02/03*
North	2.7%	1.2%	3.0%	0.9%
Center	0.9%	0.5%	0.8%	0.2%
South	1.1%	1.7%	2.3%	1.9%
Vientiane M	7.9%	-0.4%	9.0%	0.8%
Lao PDR	**2.5%**	**0.8%**	**2.3%**	**0.7%**

Source: Author's calculations based on LECS-data.

It can be noted that overall growth in consumption was stronger during the first period, from 1992/3 to 1997/8, presumably because developments in the late 1990s were disturbed by the Asian financial crisis.

Table 4.1 show the regional basis, including all households, the first period saw the strongest growth in Vientiane Municipality, which is the richest area of the country, with Central and South growing slower. Among rural households, the performance of Southern farmers was somewhat better, leaving the Central region with the weakest performance.

The development after 1997/98 was more sluggish in almost all regions. At the beginning of this period, Lao PDR experienced a bout of very high inflation as a result of the Asian crisis, resulting, in particular, in a collapse of economic growth in Vientiane municipality. Urban households in the South were the only group to experience higher growth during the second period.

Table 4.2 summarizes data on the changes in per capita consumption across all provinces, and shows that there has been a large variation in consumption growth across provinces and also within the regions analysed in Table 4.1.

Table 4.2 Growth Rates in Household Consumption 1992-2003, by Region and Province

	Growth, 5-year period		*Yearly Growth*	
	92/93-97/98	*97/98-02/03*	*92/93-97/98*	*97/98-02/03*
Northern Region	**14,2%**	**6,3%**	**2,7%**	**1,2%**
Phongsaly	21,8%	-1,3%	3,9%	-0,3%
Luangnamta	4,2%	26,6%	0,8%	4,7%
Oudomxay	-23,4%	24,8%	-5,3%	4,4%
Bokeo	-0,4%	18,9%	-0,1%	3,5%
Luangphrabang	28,3%	3,1%	5,0%	0,6%
Huaphanh	5,2%	27,3%	1,0%	4,8%
Xayaboury	27,6%	-11,4%	4,9%	-2,4%
Central Region	**4,7%**	**2,4%**	**0,9%**	**0,5%**
Xiengkhuang	24,9%	0,9%	4,4%	0,2%
Vientiane Province	8,4%	2,7%	1,6%	0,5%
Borikhamsay	-20,9%	-2,0%	-4,7%	-0,4%
Khammuane	23,4%	-1,6%	4,2%	-0,3%
Savannakhet	4,4%	4,1%	0,9%	0,8%
Southern Region	**5,5%**	**9,0%**	**1,1%**	**1,7%**
Saravane	6,4%	-14,3%	1,2%	-3,1%
Sekong	29,1%	4,8%	5,1%	0,9%
Champasak	3,3%	20,6%	0,7%	3,7%
Attapeu	1,8%	4,9%	0,4%	1,0%
Vientiane Municipality	**48,4%**	**-1,9%**	**7,9%**	**-0,4%**
Lao PDR	**13,3%**	**4,1%**	**2,5%**	**0,8%**

Source: Author's calculations based on LECS-data.

The large variation in expenditure patterns between provinces and regions indicate substantial fragmentation of the economic development, which will be further explored below.

4.3 Poverty Incidence at Regional and Provincial Levels

Data on the incidence of poverty can be used to estimate the levels of welfare in different parts of the country (see Figures 4.1 to Figure 4.3 and Table 4.3 for poverty rates across regions and provinces). Table 4.3 provide the estimates of the poverty rates for each of the 17 provinces including Vientiane Municipality, while Figure 4.1 to Figure

4.3 map these estimates. Table 4.3 indicate that Vientiane Municipality have experianced lowest levels of poverty with 16.7 percent in 2002/2003, followed by the South 32.5 percent and Central 35.4 percent, with the North being the poorest region accounting a poverty rate of 37.9 percent.

Changes in poverty rates have also varied across provinces. The most remarkable observation is probably the very rapid reduction in poverty experienced in the northernmost provinces; Huaphan with poverty rates decreasing from 71.3 percent in 1992/93 to 51.5 percent in 2002/03 and Phongsaly with 72.0 percent in 1992/93 to 50.8 percent in 2002/03. Although the overall growth performance of the South was stronger, the average impact on poverty incidence was substantially weaker than in the far North. Where Champasack experianced an impressive 19.0 percent decrease in the poverty rate from 1997/98 to 2002/03.

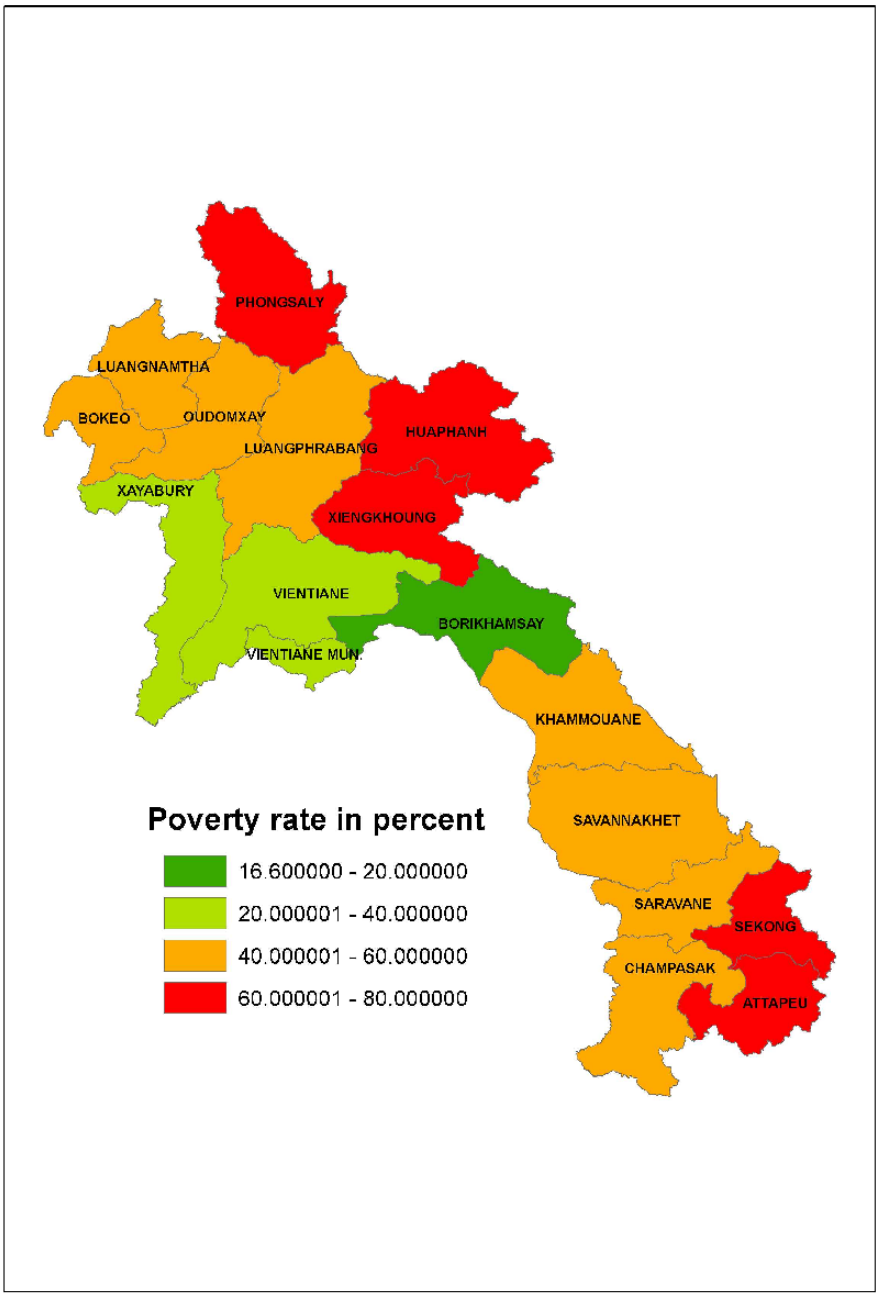
Table 4.3 Poverty Incidence 1992-2003, by Region and Province

Province	LECS1 1992/93	LECS2 1997/98	LECS3 2002/03	Change 92/93 to 97/98	Change 97/98 to 02/03
Northern Region	**51.6**	**47.3**	**37.9**	**-4.3**	**-9.3**
Oudomxay	45.8	66.1	45.1	20.3	-21.0
Luangnamtha	40.5	51.1	22.8	10.6	-28.3
Huaphanh	71.3	71.3	51.5	0.0	-19.8
Phongsaly	72.0	57.9	50.8	-14.1	-7.2
Luangprabang	58.5	40.8	39.5	-17.7	-1.4
Xayabury	22.4	17.7	25.0	-4.6	7.3
Bokeo	42.4	38.9	21.1	-3.4	-17.8
Central Region	**45.0**	**39.4**	**35.4**	**-5.6**	**-4.0**
Borikhamxay	16.6	27.9	28.7	11.3	0.8
Khammuane	47.1	44.5	33.7	-2.6	-10.8
Vientiane Province	30.7	27.8	19.0	-2.9	-8.8
Savannakhet	53.1	41.9	43.1	-11.2	1.2
Xiengkhuang	63.0	42.9	41.6	-20.2	-1.3
Xaysomboun SR	-	62.8	30.6	-	-32.1
Southern Region	**45.7**	**39.8**	**32.6**	**-5.9**	**-7.2**
Saravane	43.6	39.2	54.3	-4.4	15.1
Champasack	41.4	37.4	18.4	-4.0	-19.0
Sekong	67.0	49.7	41.8	-17.2	-7.9
Attapeu	60.5	48.0	44.0	-12.4	-4.0
Vientiane Municipality	**33.6**	**13.5**	**16.7**	**-20.0**	**3.2**
Lao PDR	**46.0**	**39.1**	**33.5**	**-6.9**	**-5.6**

Source: Author's calculations based on LECS-data.

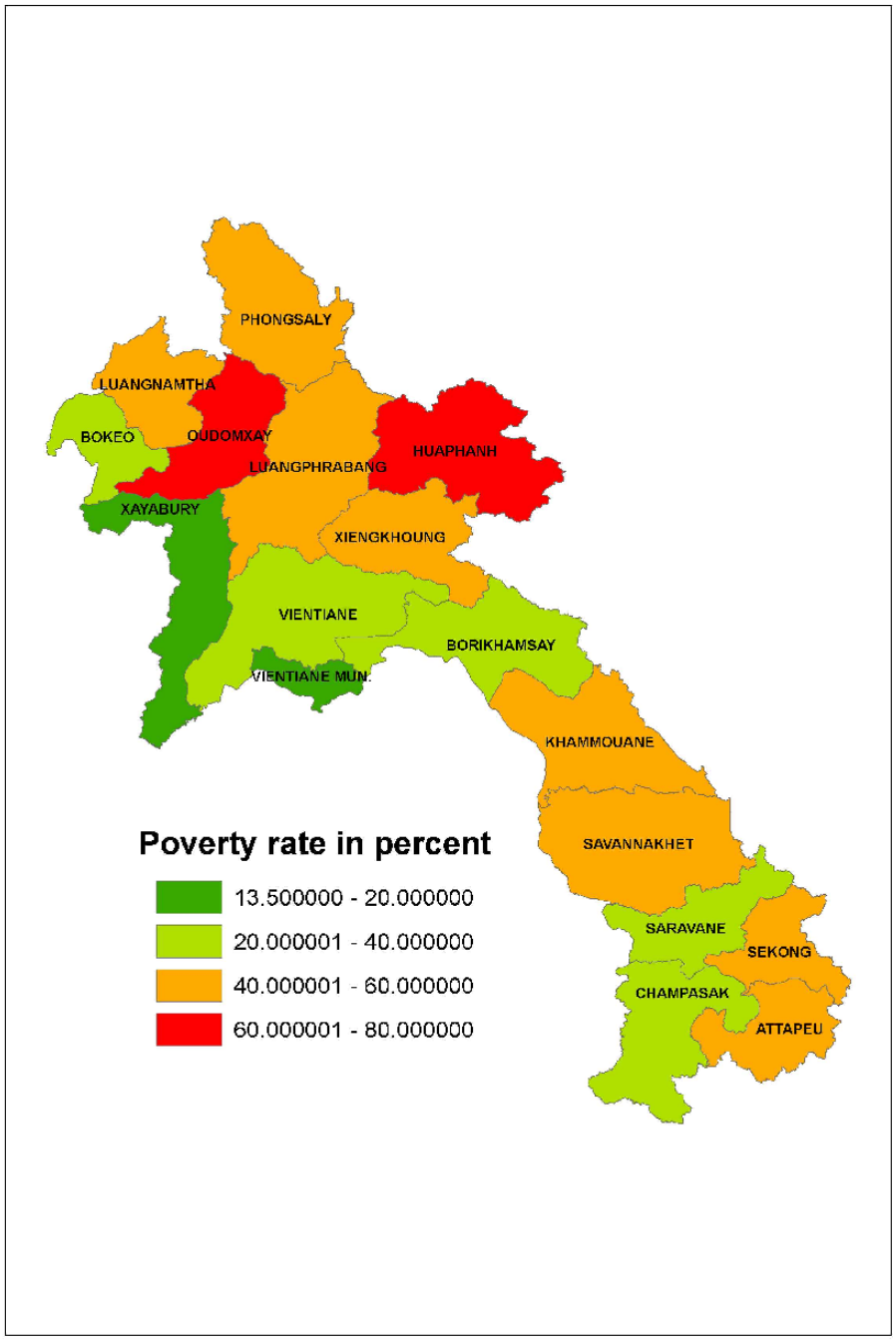
At the time of the latest nationwide household survey in 2002/03, the regional and provincial differences in poverty incidence were large. Figure 4.1 illustrate the provincial patterns of poverty where Phongsaly located in the north and Huaphan in the northeast together with the most southern provinces Sekong and Attapeu neighboring Vietnam as the parts of the country with highest poverty rates. Borikhamxay located in the central along the Mekong river neighboring Thailand experience the lowest levels of poverty rates.

Figure 4.1 Poverty Rate in Lao PDR 1992-93 (in percent)



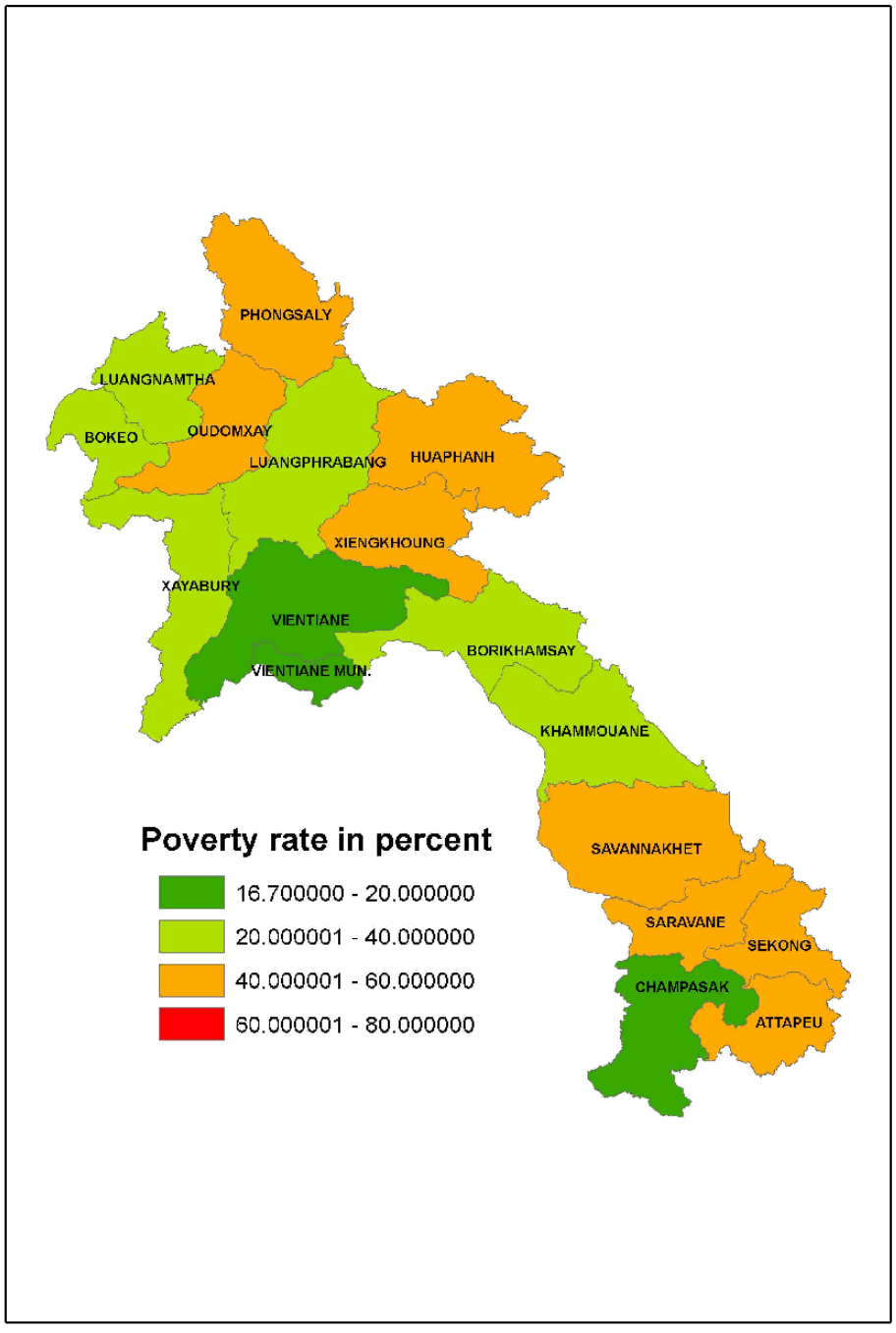
Source: Author's calculation based on LECS 1

Figure 4.2 Poverty Rate in Lao PDR 1997-98 (in percent)



Source: Author's calculation based on LECS 2

Figure 4.3 Poverty Rate in Lao PDR 2002-03 (in percent)



Source: Author's calculation based on LECS 3

4.4 Summary and Conclusions

The purpose of this chapter was to describe and analyze regional growth patterns using expenditure data from LECS 1, 2 and 3. Figure 4.1, 4.2 and 4.3 present a picture of highly divergent patterns of growth and poverty reduction in the country. The patterns identified in the analysis follows the targets which was idenitified in the government's strategy (Government of Lao PDR 2003). However, it is challenging to try to bring these trends together to paint a consistent picture of determinants of provincial growth in Lao PDR. Aggregate statistics alone are not sufficient to identify the causes for the divergent patterns of regional development. A particular focus will be put on domestic market integration and the development of a national market for freight transport services. This choice is motivated by the view that borders are important for understanding the spread of welfare in Lao PDR; domestic market integration concerns the invisible borders separating remote areas without market access from the national economy and the market freight transport services are the mean of overcoming the friction of distance. The following Chapter 5 will provide an analysis of the national market for freight transport, Chapter 6 will build on the findings in Chapter 6 and provide a study of the domestic market integration whereas the last emprical Chapter 7 will investigate the impact of being close or fare from China by comparing the economic development in the north with the south.

5. National Market for Freight Transport in Lao PDR

5.1 Introduction

The objective of this chapter is to analyze the development of the Lao freight logistics sector with a special focus on the demand for freight logistics services and the pricing of freight transport services. The guiding research questions for this chapter are formulated as following:

1. *Who are the main actors in the domestic freight transport service sector in Lao PDR, on which administrative and spatial levels do they operate?*

2. *How are freight tariffs for domestic freight transport services determined with reference to the geography and regional development of the country?*

The chapter seeks to understand how the domestic freight service sector functions and to identify the main actors of the freight service system with reference to the above research questions. Further, importance is given to how rates for domestic freight services are determined. Initiatives mainly related to transport infrastructure construction have been promoted by the government in order to achieve better connectivity and to improve market access, whereas less focus have been given to investigation of how the structure and the geographical fragmentation of the market for freight services influences transport costs on the routes covering Vientiane and the provincial centers. Calculation of tariffs for freight services is not only dependent on the actual distance transported, the quality of the roads, and the weight of the product – therefore it is important to identify factors influencing the determination of freight tariffs at different spatial and administrative levels i.e. national and provincial. The analysis can provide knowledge about the relationship between road construction, transport market development, and the development of a better integrated national market system.

Based on empirical data, the study explores three main dimensions of the development of the Lao freight logistics sector: (i) the development of a freight logistics

sector after the formulation of the New Economic Mechanism (NEM); (ii) a study of the factors influencing the sector's spatial structure; (iii) and an in-depth analysis of the rates for domestic freight services to better understand the Lao freight logistics sector pricing structure.

The first part of the chapter seeks to map the development over time and provide a report of the current status of the Lao freight logistics sector, with special reference to the transition towards a market economy, whereas the second part explores land transport freight cost on the national market with the purpose to explore the degree of integration between the capital and the provincial centers.

Since the launch of market reforms during the late 1980s, Lao PDR has shown a strong record of economic growth. Economic reforms in Lao PDR started at a major scale in November 1986, when the New Economic Mechanism (NEM) was endorsed on The Fourth Congress of the Lao Peoples Revolutionary Party (LPRP) and major steps towards transition from a centrally planned economy to a market economy were taken (for a more detailed description on the Lao development and NEM see Zasloff and Unger 1991; Ljunggren 1993; Sisoupphanthong and Taillard 2000; Evans 1988; 1990; 1998; 1999 and 2003; and Rigg 2005). Under the NEM, the Lao government announced measures to promote the development of the private sector; deregulated price and production controls, granted managerial and financial autonomy to state-owned enterprises and decreased government involvement in distribution networks. An important part of NEM was the promotion of free circulation of goods within the country. Buying and selling restrictions of agricultural products was eased and a domestic market was created. Thus giving demand for private efficient freight transport operators. These reforms, together with Lao's participation in ASEAN and its free trade area, the Greater Mekong Subregion (GMS) program and its willingness to become a member of the World Trade Organization (WTO), have created an environment with substantial opportunities as well as substantial challenges for all types of business activities.

5.2 Analytical Framework

The rationale behind the link between transport infrastructure investment and transition to a market economy is that transport investments reduce transport costs, thus providing better scope for higher market efficiency (Jacoby 2000). The conventional estimate of the immediate benefits of infrastructure investment is the fall in unit costs for each type of traffic using the infrastructure in question, multiplied by the amount of traffic. This would represent the costs saving for existing traffic, and is believed to encourage economic performance in various ways (Banister & Berechman 2001). Logistics services, as one factor in the production of goods and services, represents a cost to individual businesses. Greater efficiency in the logistics sector can help reduce cost, which may stimulate greater demand, so that firms may enjoy enhanced scale economies, perhaps resulting in a virtuous circle of further cost reductions and sales growth (Button 1993). In addition, reductions in transport costs can have substantial effects on market conditions, since transport costs may function as an entry barrier to many smaller markets. With high transport costs, it is possible that there is only room for a small number of actors in the market, resulting in a situation with low competition and relatively high price-cost margins. When transport costs are reduced, there is not only a direct price effect in goods markets, but perhaps also an indirect competition effect that is related to reduction in entry barriers.

The main objective of the freight transport sector is to overcome distance and provide efficient transport services from one geographical location to another. The level of interconnectivity within the transport system is not only dependent on road access and quality of the physical transport infrastructure but also on the market for freight transport services. A central issue in the present context is the constraints created as a consequence of low levels of quality of the national transport infrastructure. This is an important reason for the traditionally fragmented structure of the national freight transport system in Lao PDR. This structure gives importance to local freight service operators and their ability to supply efficient transport services to different spatial levels.

A critical component for the successful integration of the local economy into national, regional and global markets – and a precondition for realizing the potential gains from trade – is an efficient and well functioning national transport logistics system. The performance of the national logistics system is an important facilitator for both export and import trade, but also for domestic distribution (Sadoulet & de Janvry 1995). Efficient distribution systems with low transaction costs are expected to transfer goods produced elsewhere to the local consumer at a competitive price, at the same time as local producers can get a competitive price for their commodities (Pelton *et al* 2002). Geographical factors such as location, distance to markets, and road accessibility naturally have a significant impact on the costs of intermediate and final goods. This means that transaction costs – including transport costs and costs for retrieving information about prices and market conditions – can have a direct effect on firms opportunities to increase their earning (Gannon & Liu 1997).

As can be seen, freight transport services are an important area for both businesses and society, and there is a great interest from a large number of actors. However, freight transport services transport has had problems meeting the high expectations. There is a lack of knowledge on the potential and design of freight transport systems within countries in transition towards market economy. For example, politicians, government agencies (e.g. rail and road administrations), and regulating bodies need information on the possible potential of freight transport, in what areas and under what circumstances the sector has it's best potential and the environmental effects of the transport system. Freight service companies need information on if and how they best should use and design their systems. Any freight transport system must be sure to have both a sustainable competitive advantage and a good market entry ability to be successful.

Researchers, studying freight transport systems and their markets, also face similar problems when trying to test how new regulations and new innovations influence the system. Questions that need to be answered include the effect of changed control

instruments (e.g. taxes and regulations), new infrastructure investments, new terminals, new technology, changed truck sizes and speed, changed transport demand are all important determinants of the efficiency of a freight transport system as illustrated in Figure 2.3 in Chapter 2. There is a need for further studies about how freight transport sector in general and, in particular, there is a need for tools to evaluate the potential in the freight transport sector and for help in designing a competitive freight transport system especially in countries where the physical barriers to trade are large. To answer these questions, it comes naturally to look towards the more quantitative tools. Some kind of calculation model of the transport system is necessary to allow for the system to be developed and tested and the potential evaluated. The use of a model gives the researcher the potential to control the design and behavior of the system.

5.3 Freight transport in Lao PDR

5.3.1 Demand for Logistics and Transport Services

Expanding trade is an important part of the market-oriented policy reforms in Lao PDR. Successful outward oriented development requires not only trade reforms, but also improvements in both the hard and soft infrastructure of trade, such as ports, roads, and railroads, customs administration, insurance, finance, and related institutional structure governing logistics services. Increasingly congested ports and insufficient transport facilities, as well as institutions focused on control rather than on trade facilitation and the lack of access to trade financing have become obstacles to business development.

During the period 1992-2005, exports of Lao PDR to the other five GMS[3] countries grew by 16 percent, on a compounded annual average basis, from US$48 million to US$314 million, accounting for almost half of its total exports, which similarly

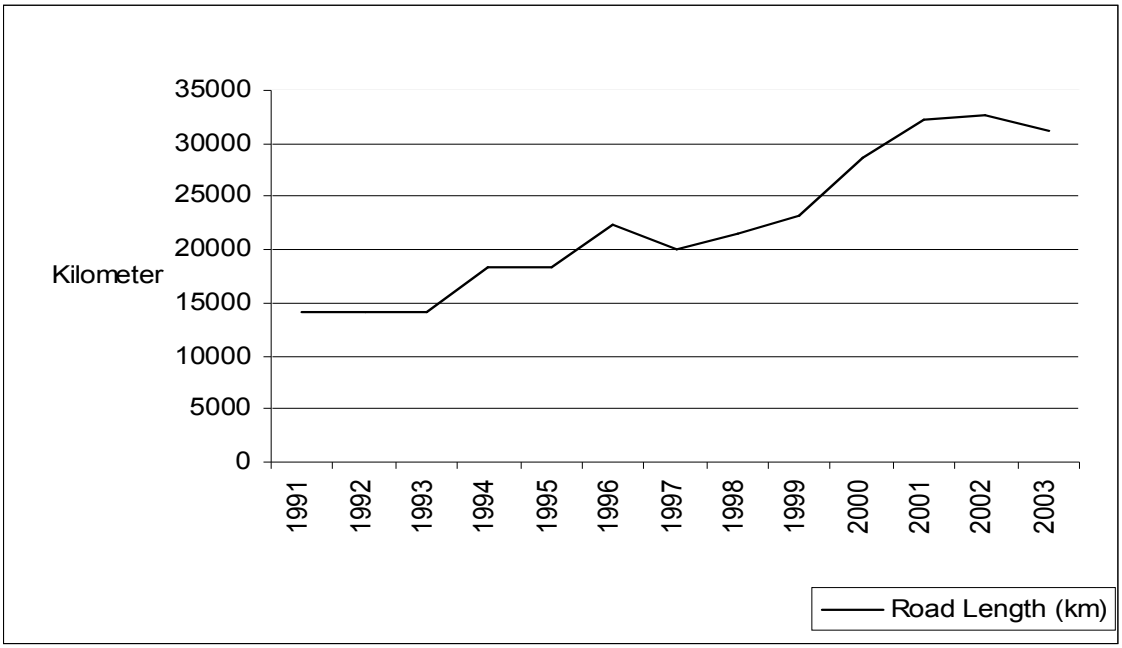
[3] The GMS member countries are: Cambodia, People's Republic of China (Yunnan & Guangxi province) Lao PDR, Myanmar, Thailand and Vietnam

grew by an average of 16 percent (IMF-DOTS). Overall, the growth of Lao PDR intra-GMS trade has been reasonably rapid and in line with the process of economic integration with regional and global markets. Trade has not only increased between the capital Vientiane and through major transit routes with Thailand, but there has also been an increased interaction between provincial center and Vientiane (Andersson *et al.* 2006).

There are four key elements that influence the transport and logistics system in Lao PDR: (1) landlockedness, which creates a dependency on transit traffic through neighboring countries; (2) a geographically scattered population; (3) high dependence on subsistence agriculture; and (4) weak transport infrastructure that impedes the integration of scattered local and provincial markets.

Large investments in transport infrastructure have been carried out with the purpose to alleviate the negative impact of these characteristics on national economic development and integration both within the country and with neighboring countries. The rapid increase in trade together with the specific characteristics of Lao PDR raises the importance of capable logistics services. Figure 5.1 illustrate the expansion if the road network from 1991 to 2003. The government policy to favor regional growth with the purpose to narrow the gap between poor and rich provinces was partly conducted by road investments (Bourdet 2000).

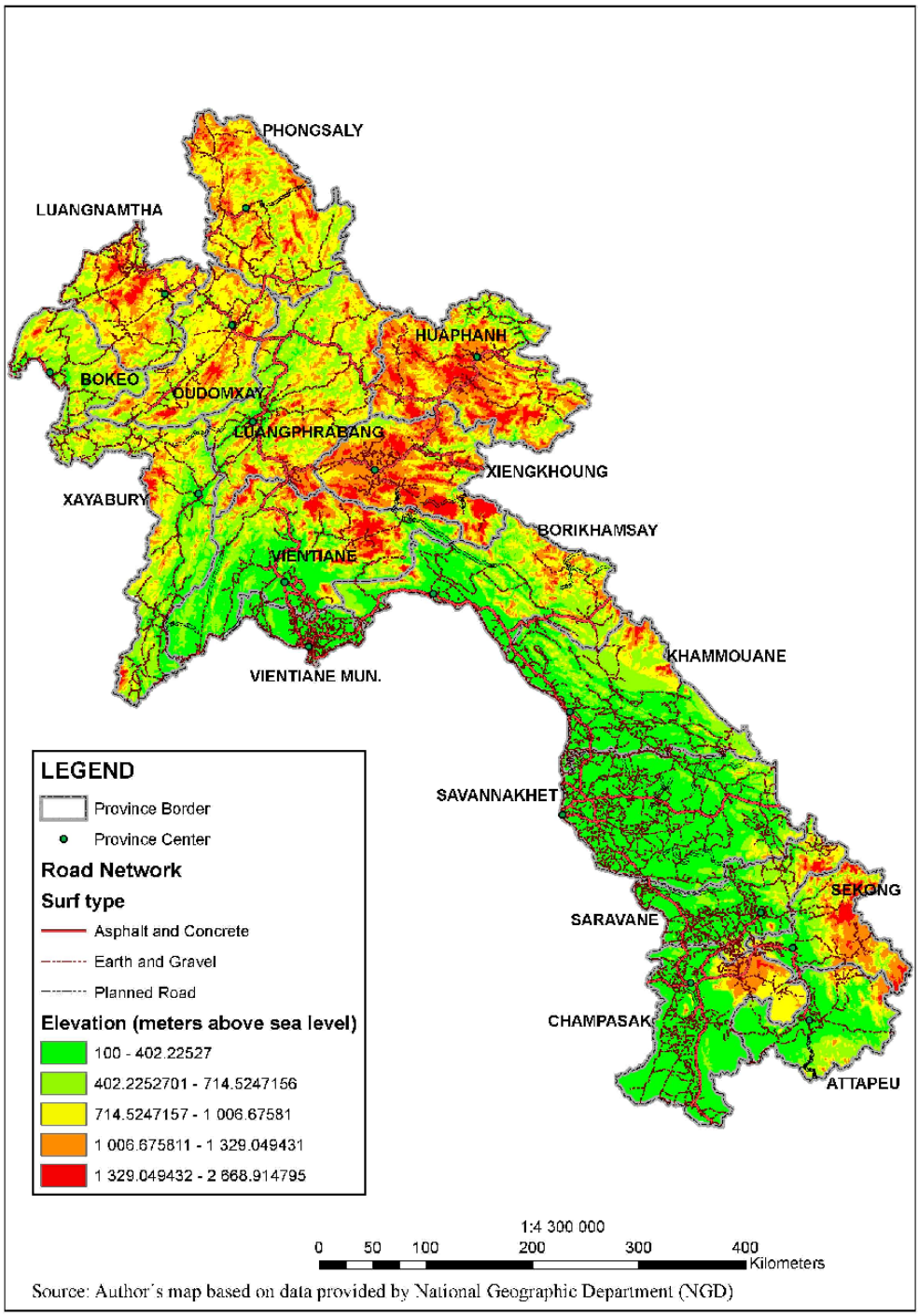
Figure 5.1 Total Road Length Year 1991 - 2003



Source: UNESCAP (2007)

There were in year 2006 a total of 31,199 km roads divided into 4,500 km of paved roads, 10,100 km of gravel road, and 16,600 km of earth roads, as Table 5.1 shows. The largest part of the road network consists of earth roads. Much of the network is not ready for all weather traffic and thus not accessible all year around. The national road system consists to 53 percent of paved roads. To upgrade and pave roads between Vientiane and the provincial centers was the focus of the heavy investments in roads during the 1990s.

Figure 5.2 Elevation and Road System of Lao PDR



Source: Author's map based on data provided by National Geographic Department (NGD)

Figure 5.2 illustrate the geographical difficulties provided by the mountainous landscape. The northern and northeastern parts of the country are located on high elevation giving a less dense road network. Whereas the central and southern parts of the country are located on lower elevation with a better network of earth and gravel roads.

Table 5.1 Total Road Length Year 2006 (in kilometer)

Surface Type	*Administrative Classification*						
	National	*Provincial*	*District*	*Rural*	*Urban*	*Special*	*Total*
Paved	3,771	198	31	14	429	54	4,497
Gravel	2,244	3,038	1,826	1,815	871	304	10,097
Earth	1,126	3,240	2,008	9,527	465	249	16,615
Total	7,141	6,476	3,865	11,356	1,765	607	31,199

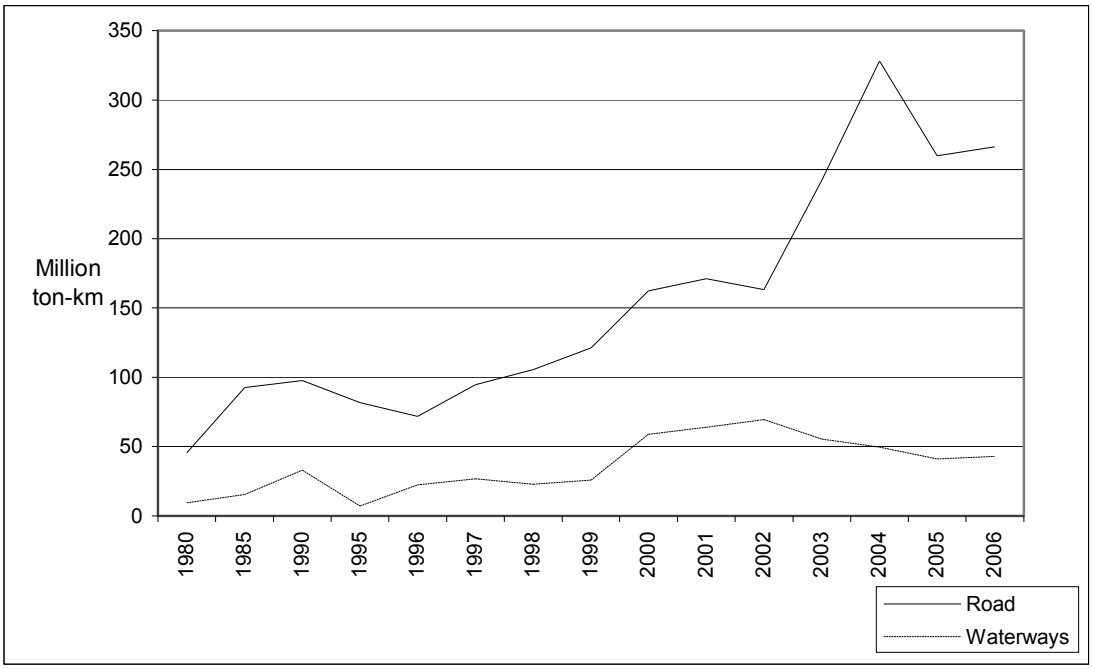
Source: UNESCAP (2007)

The development of the road system has been concentrated on improving national routes and enhancing maintenance capacity. Major transport corridors have been upgraded, with links restored between the northern and southern parts of the country (Arnold 2000). All provincial centers are to be joined to the national network with all weather roads. The road network carries the dominant share of passenger and freight movements in Lao PDR, as illustrated in Table 5.3, with a widening gap between road transport and inland water transport. National statistics indicate that road transport had a share of 70 percent of the freight transport in 2002, with almost all of the remainder being carried by river transport (UNESCAP 2007). The government has provided investments to increase the capacity of inland water transport, with about half of the 21 ports on the Mekong River rehabilitated in the last 15 years.

The demand for freight has increased very rapidly since the early 1990s, from 551,100 tons transported in 1990 to 1,946,000 tons during year 2002 by land transport. There are similar rising trends in freight tasks, which are defined in terms of the number of ton-km of goods that are moved by the Lao transport system and shown in Figure 5.3. The rapid expansion of road construction which was illustrated in Figure 5.1 and Table

5.1 can be seen in the increase of domestic freight movements. Figure 5.3 provides an illustration of the large increase of freight movements (48 percent) starting year 2001 with a downturn in year 2004.

Figure 5.3 Modal Share of Domestic Freight Movements



Source: MPWT 2007

As Table 5.2 shows, the increase from 97.7 million ton-km in 1990 to 163.4 million ton-km in 2002 is not as rapid as the increase in movement of freight. The difference between increased movement and freight and freight task suggests that the volume increase has been faster than the increase in the distance transported. This indicates that the growing trade and transport contacts are mainly concentrated to locations that are geographically close to each other.

Table 5.2 Freight Movements

Year	*Land*	*River*	*Air*	*Total*	*Land*	*River*	*Air*	*Total*
	Freight movement (1000s ton)				*Freight task (million ton-km)*			
1990	551.1	106.0	0.5	657.6	97.7	33.0	0.2	130.9
1995	950.0	476.0	1.2	1,427.2	81.6	7.1	1.8	90.5
1996	978.0	537.0	1.2	1,516.2	71.8	22.5	0.7	95.0
1997	1,029.0	604.0	1.2	1,634.2	94.7	26.6	2.2	123.5
1998	1,004.0	567.0	1.4	1,572.4	105.4	22.8	0.7	128.9
1999	1,225.0	602.0	1.4	1,828.4	121.1	25.9	0.5	147.5
2000	1,635.0	672.0	1.5	2,308.5	162.2	58.9	0.6	221.7
2001	1,543.0	739.0	1.4	2,283.4	171.1	64.0	0.4	235.5
2002	1,946.0	770.0	1.9	2,717.9	163.4	69.6	0.6	233.6

Source: UNESCAP (2007)

Table 5.3 illustrates the domestic traffic mix divided according to road type and vehicle used. National roads are the fundament of the road system connecting Vientiane with the provincial centers, and also the main object of study for the national system of freight transport services. On all types of roads, vehicles are related to agricultural production and passenger transport or freight transport, with very low frequency of passenger cars.

The road network does not generally carry high volumes of traffic. For example, the average of vehicles with four or more tires on all national roads is 370 vehicles per day, with provincial roads carrying less than a third of this number. Traffic on all-weather roads is considerably higher, especially for provincial roads, which have a greater share of access-constrained roads. However, vehicles with four or more tires account for only 30 percent of traffic on roads in Lao PDR, with the share being highest on national roads (42 percent) and lowest on rural roads (8 percent). Medium and large buses and trucks account for a substantial 36 percent of the 4 or more tires´ traffic on national roads.

Table 5.3 Traffic Mix Year 2004

	Administrative classification					
	National	*Provincial*	*District*	*Rural*	*Urban*	*Special*
Traffic mix (% by vehicle type on each road class for all roads)						
Bicycle	14	20	27	31	16	24
Mini tractor	6	13	17	17	6	16
Motorcycle & tuk-tuk	38	41	42	44	62	34
Subtotal (<4 tires)	*58*	*74*	*86*	*92*	*84*	*70*
Car	4	3	3	0	5	2
Pickup	12	8	3	2	5	8
Small bus	4	3	1	1	1	3
Medium bus	4	2	1	2	0	2
Large bus	2	0	0	0	0	0
Light truck	6	4	4	1	3	2
Medium truck	5	3	1	2	1	5
Heavy truck	3	2	1	0	0	4
Truck trailer	1	0	0	0	0	0
Total	100	100	100	100	100	100

Source: UNESCAP 2007

5.3.2 Structure of Lao Transport Industry

The Ministry of Public Works and Transport (MPWT)[4] is responsible for the planning, construction and macro-management of roads, waterways, civil aviation, transport, communication, housing and urban planning for urban and rural areas nationwide (Decree, May 12 1999). The various provincial Departments of Communication, Transport, Post and Construction (DCTPC) are responsible for the implementation, the construction and maintenance of road within their respective province or municipality as delegated by the MPWT (Agreement, 1993). Offices of Communication, Transport, Post and Construction (OCTPCs) are located at the district level and are responsible for the maintenance of roads under their jurisdiction as delegated by the provincial DCTPC in compliance with the communication management guidelines developed by MPWT (Agreement, 1993).

[4] formerly known as The Ministry of Communication, Transport, Post and Construction (MCTPC)

The Lao International Freight Forwarders Association (LIFFA) was established by ministerial decree in 2001. LIFFA currently has around 20 members composed of freight forwarders, trucking companies and customs brokers. The majority of the members are based in Vientiane where most of the transit traffic is concentrated.

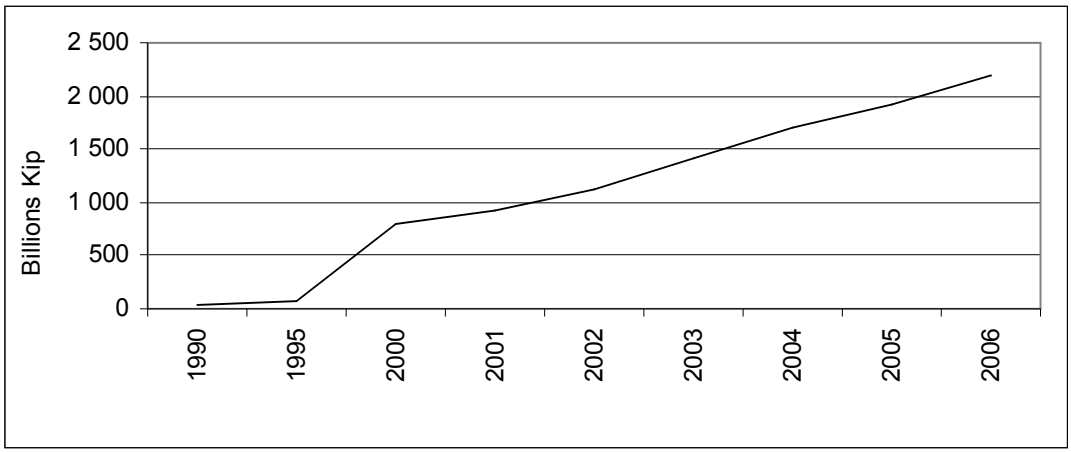
Under the 1999 road transport agreement with Thailand, Lao trucks are able to deliver and collect Lao import or export goods to and from Bangkok or Laem Chabang port. However, to date none have been able to do so. The reason may be partly that Thai authorities are still reticent about having Lao trucks on Thai road for numerous safety reasons but also because it is difficult for Lao trucks to get return traffic. This makes the transit cost high compared to just transloading the goods on Thai trucks in Nongkhai (located in Thailand across the friendship bridge over the Mekong River which connects Lao PDR and Thailand) and getting return traffic into Lao PDR from the same location.

There is a free exchange of truck operations between Lao PDR and Vietnam, i.e. Lao trucks can go anywhere in Vietnam and vice versa. Lao operators know Vietnam roads better than roads in Thailand and driving is on the same side of the road which facilitates cross border transport.

Lao trucks can go as far as Kunming in Yunnan Province in China whereas Chinese trucks may come as far south as Vientiane. However, truck operators from Lao PDR hesitate to drive on Chinese roads as there are frequent stories about informal roads tolls among truck operators in northern Lao PDR[5]. The borders with Myanmar and Cambodia are currently closed to truck traffic.

[5] Based on information from truck operators based in Bokeo and Oudomxay.

Figure 5.4 Value-added of Transport, Storage and Communications Services



Source: SWECO 1991; UNESCAP 2007

Freight services in Lao PDR are provided by private companies under regulations governed by the MPWT and provincial DCTPC. Figure 5.4 illustrates the growth of added value provided by logistics services in Lao PDR since 1990. The increase in the sector's value added is significantly faster than the increase in freight volumes and freight tasks discussed in Table 5.2.

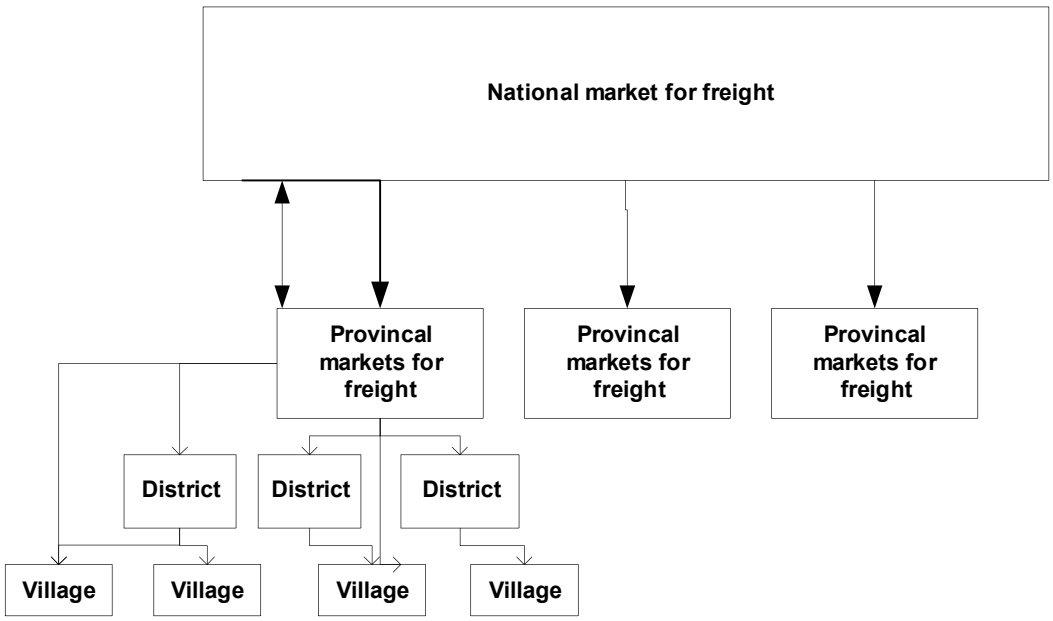
The structure of the Lao transport industry is illustrated in Figure 5.5 where three spatial levels with actors are identified. The first level is the national market for freight serving the provincial centers with freight mainly with commodities from Vientiane. The freight service providers are located in Vientiane and provide services for imported goods and products produced in Vientiane to the provincial centers. These actors have access to large vehicles and often hold access to larger contracts of freight movements. They also cooperate and subcontract to smaller freight transport service providers located in Vientiane. Larger operators based in Vientiane lack local knowledge about roads and the conditions in the provinces with force them to cooperate with smaller operators located in the province of destination. Subcontracting or sharing resources for larger shipments destinated for remote locations are not uncommon. This is of particular importance

during wet season when many local roads are flooded and damaged during long periods of time.

The possibility of getting return freight tasks from the province to Vientiane is low as the freight transport providers in the provinces protect their market. Thus this provides higher costs for transport of freight in the direction Vientiane – provinces.

The second level corresponds to provincial markets where provincial actors hold the power to supply the surrounding districts and villages with freight transport but also more importantly hold the power to transport commodities from the province to Vientiane. Firms located in provinces that produce of export commodities mainly utilize provincial freight service providers when transporting their products to Vientiane.

Figure 5.5 Structure of the Lao Market for Freight Transport



Source: Based on fieldwork and information provided by freight transport service providers.

The freight service providers based in the provinces are smaller than their competitors located in Vientiane and hold a vehicle fleet consisting of vehicles with lower capacity thus more flexible when operating. When the transported cargo is unloaded in Vientiane these smaller operators wait for new shipments from Vientiane to bring back to their origin or to deliver somewhere on the way back to their province. The waiting time for cargo can be up to several days however the possible profits from receiving cargo on the return trip make it worth waiting and this is a competitive advantage towards freight operators located in Vientiane. On the other hand freight operators located in Vientiane have difficulties to find return cargo in the opposite direction as the demand for freight is lower from the provinces to Vientiane.

The third spatial level corresponds to the districts where transportation of freight often is conducted in conjunction with passenger transport. Transport service providers located in the districts serve villages with transport of passengers and freight from both provincial and districts centers.

The organization of the sector can be found on all three spatial levels. Trucking associations at district levels have been in existence since the late 1980s. Many of them act as freight brokers as well as schedule coordinators between members. Provincial trucking associations have now been established in 7 provinces and there are plans to expand to other provinces. The MPWT is working on organizing a national association of trucking operators which may come under the umbrella of LIFFA.

In Vientiane, there are 14 trucking companies and 6 associations, with a total fleet of 1,211 trucks in number. This includes 605 6-8 tonnes trucks; 363 10-12 tonnes trucks; and 243 18-22 tonnes trucks[6]. Around 50 percent of the trucks are old Soviet trucks and the remainders are used second hand Japanese and Korean trucks. The average truck age is more than 10 years. Trucking companies are usually family businesses with staff that

[6] Interview data from the Department of Roads, MPWT

learned the trucking business “on the job”. There exist foreign-owned freight forwarders in Lao PDR but there is no foreign owned or joint-venture truck operator. Truck tariffs are subject to negotiation between individual shippers and operators.

Savannakhet Province is the 2nd most important province in Lao PDR located in the southern part of the country. The province has in total 738 trucks. This includes 280, 1-6 tons trucks; 347, 8-12 tons trucks; and 101, 14-23 tons trucks. The current truck fleet is a mixture of used Japanese/Korean trucks (10-15 years old) and Soviet era trucks (more than 20 years old). In Savannakhet, Lao trucks have access to Vietnamese roads. Some Lao trucks move freight between Savannakhet and Hue, Danang and Hanoi. In 2005, truck traffic from Vietnam was 14,361 in number and carried 37,433 tons; the traffic to Vietnam was 14,475 in number and with a cargo volume of 264,562 tons. It was reported that Vietnamese carried up to 95 percent of the total Lao PDR-Vietnam traffic. Truck traffic from Thailand in 2005 was 9,845 in number and in 146,124 tons in volume; truck traffic to Thailand was 6,238 in number and 131,946 tons in volume. Lao trucks can deliver goods to Mukdahan in Thailand by crossing the second international bridge over Mekong.

Private truck operators and freight forwarders agree that the condition of roads in Lao PDR has improved significantly in recent years. There are several reasons for this – including the rehabilitation of several roads and improved maintenance, as well as higher levels of enforcement against overloaded vehicles – however the industry has benefited from an increase in permitted maximum axle weights from 8.2 to 9.1 tons in 2002. Views vary on the extent of competition in the trucking sector. International trucking tariffs do appear high, but this is probably due to other factors. The Lao Chamber of Commerce does not consider that the industry is very competitive because it is a very small market, the players know each other and they agree on prices. On the other hand some transport service operators argue that the domestic industry is very competitive and that tariffs are consequently very low – not even covering fuel costs. The larger operators complain that the small operators are able to undercut their tariffs because they do not

pay taxes. Transport service operators also agree that weighing and enforcement of overloading is in principle a sound idea to protect roads. One operator said that the enhanced enforcement initiative against overloading had caused him to increase tariffs slightly.

Other major difficulties reported by Lao trucking operators on the transport routes were aged trucks, high oil prices, lack of return load and insufficient skills of trucking management and drivers.

Some trucking operators expressed concerns about loading charges. These charges were evident at some provincial destinations. Government officials charged the freight transport service provider a certain amount in order to provide permission to unload the goods transported. These types of charges are treats to the free competition on the national market for freight transport as they provide an increased uncertainty for the service providers.

5.4 Deregulation and Liberalization of the Transportation Service Sector in Lao PDR

The institutional infrastructure in place affects the way policy makers promote the use of certain modes of transport and therefore organizations such a trucking associations and freight forwarders' association make up a crucial component not only serving as a coordinator between the different organizational levels the country's transport sector is divided in but also to promote the transport service industry within the overall development policy formulated by the government which is to transform Lao PDR from a landlocked to land-linked (ADB 2005b). Institutional infrastructure also encompasses the availability of credit, and provision of efficient markets.

Two major strategic economic groupings provide the framework for improved regional transport integration in the region: the Association of South East Asian Nations[7] (ASEAN) framework agreements and the ADB led Greater Mekong Subregion initiatives. Acceding to United Nations agreements on international trade and transport would also be of benefit the Lao capability to reach global markets.

There are ASEAN framework agreements that directly impact on the Lao logistics industry. The first one is the ASEAN framework on the facilitation of goods in transit signed in 1998 and the second is the ASEAN framework agreement on multimodal transport signed in 2005. However, their implementation is still lacking due to difficulties in negotiating implantation protocols. The third ASEAN initiative is the endorsement of the ASEAN roadmap for the integration of the ASEAN logistics sector in 2007. This roadmap calls for enhanced liberalization of logistics service within member countries and have set the target date to 2013.

The GMS countries have also signed the GMS Cross Border Transport Agreement (CBTA) in 2007. The objective of the CBTA is to facilitate the movement of people, freight and vehicles within the GMS. In the agreement there are provisions related to exchange of traffic rights and the number of designated transit licenses per country.

The proliferation of such agreements hinders rather than helps Lao PDR. The Lao government is drowning in bilateral, trilateral and multilateral agreements covering international and transit trade, which have different operational modalities according to their respective aims.

The Lao transport and logistics industry is faced with numerous challenges. Their market will be liberalized by 2013 under ASEAN and their government has acceded to

[7] Members of ASEAN are Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Singapore, Philippines, Thailand, and Vietnam

some controversial ASEAN protocols such as the one limiting the number of transit trucks to 60 per member country while the CBTA permits up to 500 designated transit vehicles. The fear is that the local logistics industry is not even aware of the development that will occur and have no response to such development. The local industry which emerged after the introduction of NEM may disappear even before it is strong enough to survive in the expanding market.

Current issues faced by the Lao logistics industry include: relatively (compared to adjacent countries) low weight limits for trucks, which result in higher transport costs for operators (and consumers) compared to other ASEAN countries; the extent of vehicle overloading by some freight operators to reduce their costs (requiring more rigorous enforcement); regulations on the use of containers in Lao PDR; transit fees for freight services using Lao PDR as a land-link between neighboring countries; the high costs for (imported) parts; the lack of professional knowledge in the truck management and operations. A major change in the conditions for the trucking industry in many developing countries has been the decision of the governments to strictly enforce axle load regulation, (though hard pressed by the donors involved financing road construction, which made this a precondition for further support to road rehabilitation). In Lao PDR this decision has led to a reduction in payload to almost half of what trucks used to carry. Therefore the industry initially protested strongly, but appears now to have accepted the axle load regulation under the condition that these regulations, which were previously connected to heavy corruption, are enforced for all participants. Although enforcement of the axle load regulation has reduced payload and led to increased transport rates, it has also increased the travel speed (which with the heavy overloads were often very low) and reduced the vehicle maintenance costs.

5.5 The National Market for Freight

Can differences in freight costs across destinations be attributed solely to the distance the load is transported, or do other factors such as road quality, market structure and travel time matter? If the other factors influence total freight costs, are these effects

quantitatively important? The purpose of this part of Chapter 5 is to examine the national market for land transport freight using a data set with price information from a private land transport service provider located in Vientiane Municipality.

Transport infrastructure has been related to location theory and interregional trade with reference to distance between producers and customers. Here the friction of distance is depending on access to transport infrastructure. The efficiency to overcome the friction of distance is measured by transport costs. The theme is used for different purposes by several academic disciplines. Economist use transport infrastructure in explaining the functioning of markets, geographers explain activities in space, and traffic engineers use the concept to obtain information on size and direction of traffic flows. The aim of this part of the study is to combine these three perspectives with the purpose to provide an overview of the national market for land freight services and to estimate how different factors influence total freight transport costs. The relationship between freight transport costs, distance, road quality and competition is tested using a regression framework.

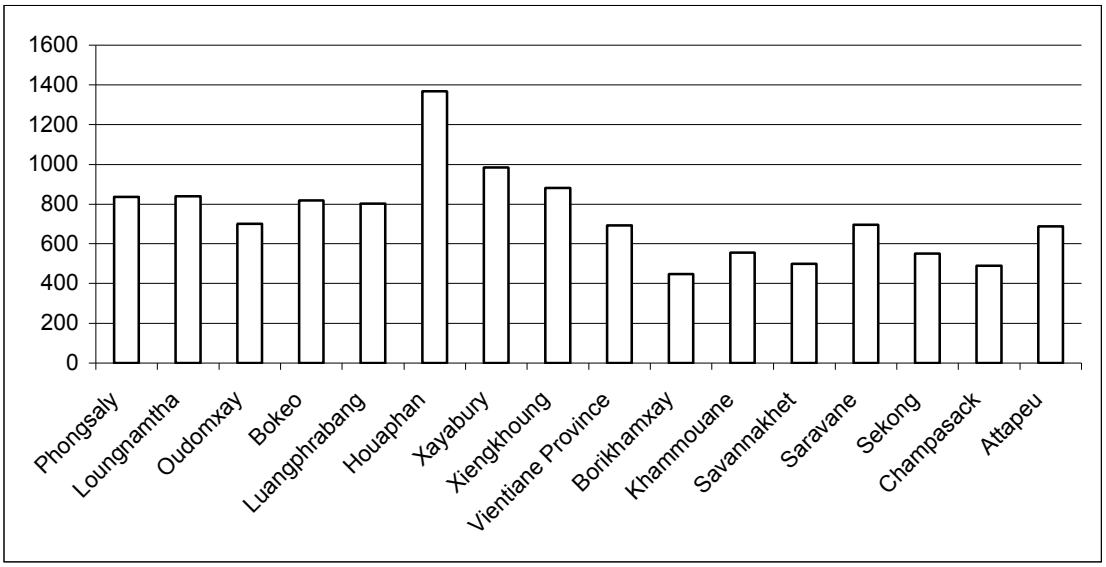
The starting point of the analysis is to convert the freight costs[8] given in price per six wheel truck load and ten wheel truck load to the provincial centers in Lao PDR into freight rates in Kip per tons – kilometer to each destination. The data provided was separated into total cost and share of fuel costs per truck load.

As shown in Figure 5.6 freight rates to the provinces located in the Northern Region; Phongsaly, Loungnamtha, Bokeo, Luangphrabang follow the same rate around 800 Kip per ton-kilometer, with Oudomxay as the cheapest destination at around 700 Kip per ton-kilometer. Oudomsay is the communication cross point for cargo between Vientiane and PRC. Xayaburi is only accessible via Luangpraphang, which explains the

[8] Freight costs were provided by one of Lao PRD's largest freight transport service providers located in Vientiane Municipality in Kip. 1 USD is approximately equivalent to 900 Kip for year 2006.

higher costs. Houaphan is located on the northeast border to Vietnam holding the highest freight rate in the country.

Figure 5.6 Freight Rates from Vientiane to Provincial Centers (year 2006 in Kip per ton-kilometer by six wheel truck based on a 12 tons load)

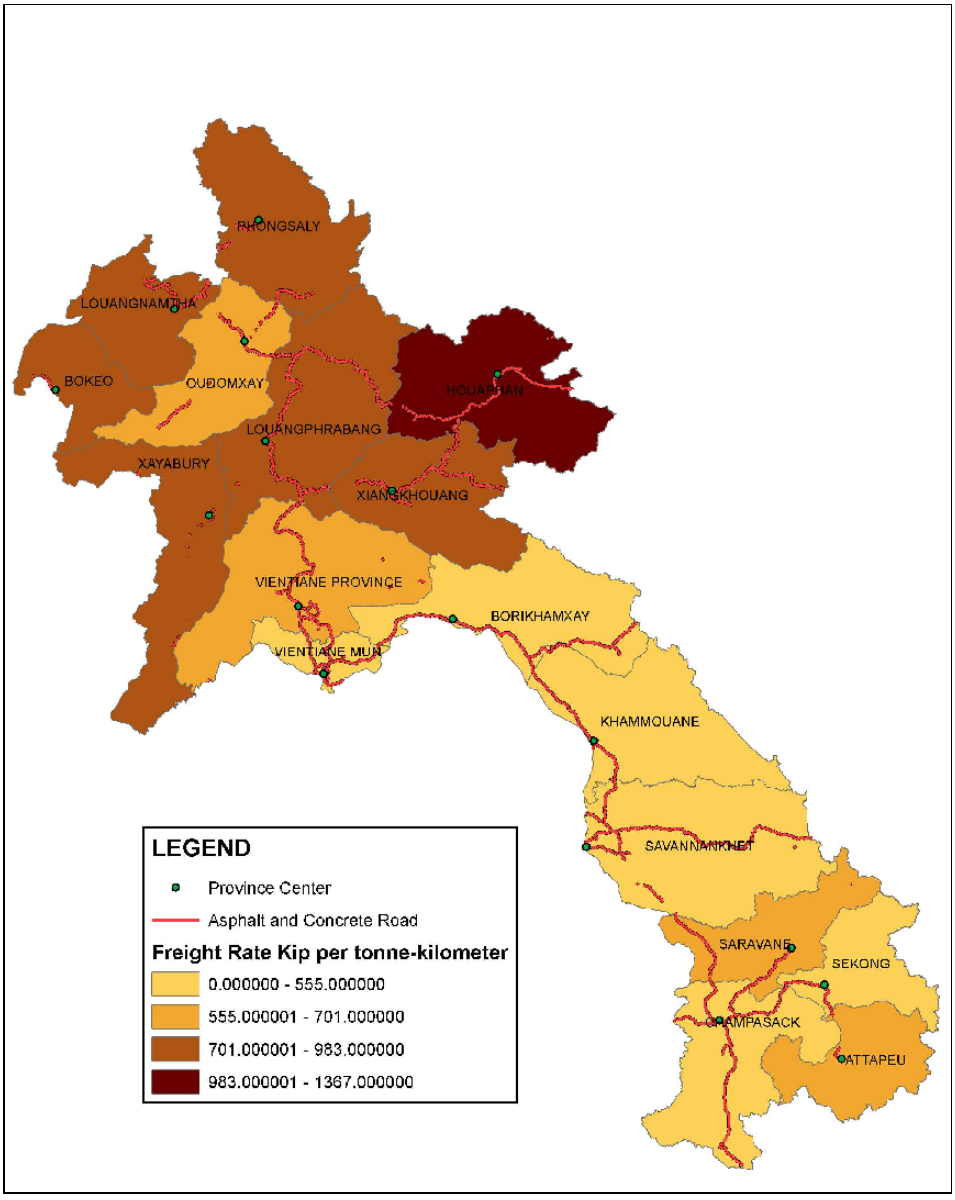


Source: Information provided by Freight Service Operator located in Vientiane Municipality, Lao PDR

Note: The calculation of freight rates are based on total cost of a six wheel truck load with maximum load of 12 tons. Distance in kilometer provided by MPWT.

The provincial centers located in the Central Region can be divided into two groups based on the difference in freight costs as illustrated in Figure 5.7; provinces located north of Vientiane including Vientiane Province, Xiengkhuang where the geography consists of hilly terrain with high freight costs.

Figure 5.7 Freight Rates from Vientiane to Provincial Centers (year 2006 in Kip per ton-kilometer by six wheel truck based on a 12 tons load)

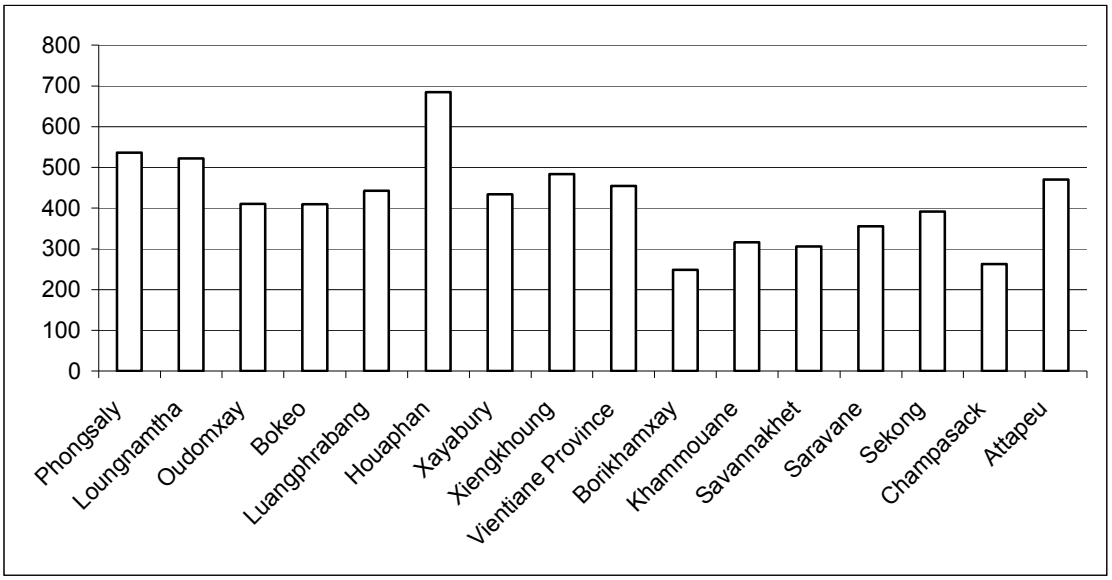


Source: Author's map based on data provided by transport service provider, National Geographic Department (NGD) and Ministry of Post, Waterworks and Transport (MPWT)

The provinces located along the Mekong River Valley consisting of Borikhamxay, Khammoune and Savannakhet hold the lowest freight costs. It is interesting to note that the freight rate based on Kip per ton-kilometer to Oudomxay is lower than for example what Louangphrabang experience. One possible explanation can be found in Oudomxay's strategic location being a node for freight transport not only between Vientiane but also for freight transport between northern Thailand and northern Lao PDR including freight flows between China and Thailand.

Figure 5.8 provide an illustration the freight rate change as a consequence when increasing the load from 12 tons (as shown in Figure 5.6 and 5.7) to 22 tons. Most provinces experience a 50 percent drop in prices when using larger vehicles with a heavier load.

Figure 5.8 Freight Rates from Vientiane to Provincial Centers (year 2006 in Kip per ton-kilometer by ten wheel truck based on a 22 tons load)



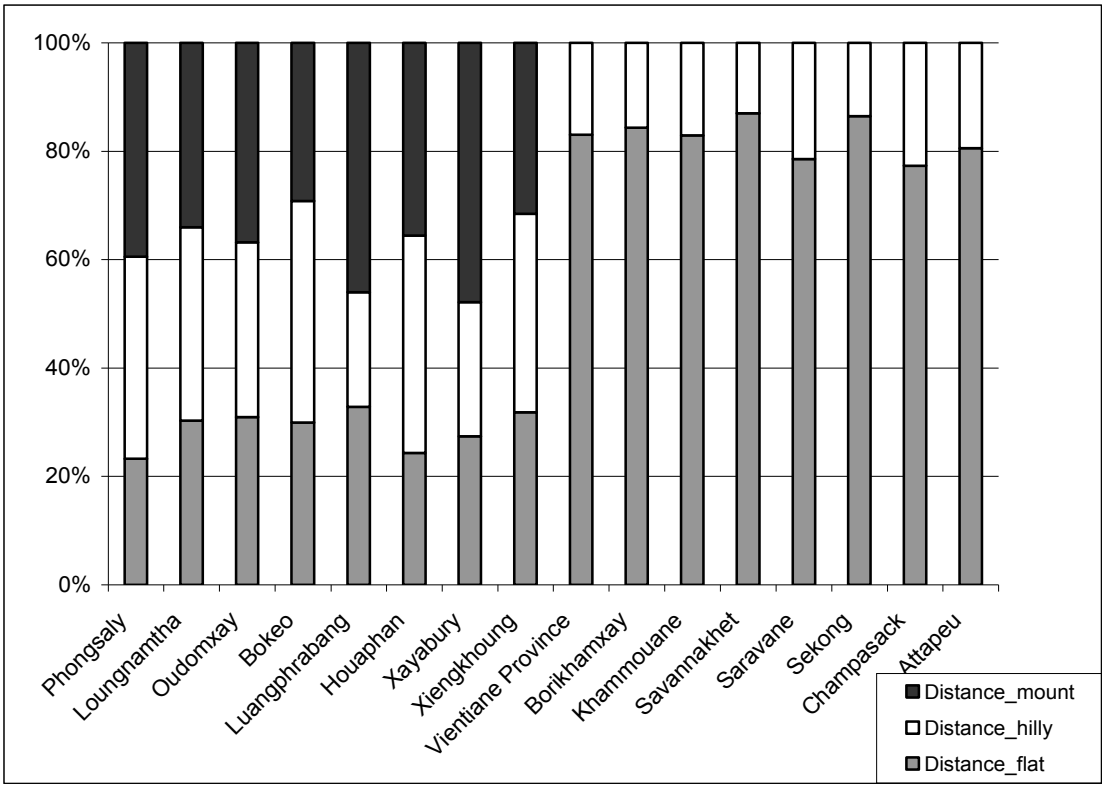
Source: Freight Service Operator located in Vientiane Municipality, Lao PDR

Note: The calculation of freight rates are based on total cost of a six wheel truck load with maximum load of 12 tons. Distance in kilometer provided by MPWT.

However, the provinces with lowest freight rates located in the central and southern parts of the country; Borikhamxay, Champasack and Attapeu experience a smaller decrease in the freight rates.

Figure 5.9 illustrate classification of the road and the share of the total route classified into mountainous, hilly and flat road sections. This classification has impact on both time consumption and fuel consumption in transport and can be used to proxy the road quality.

Figure 5.9 Road Quality on Routes from Vientiane to Provincial Capitals



Source: UNESCAP Asian Highway Database and Author's calculations.

Note: The classification used; Distance_mount, Distance_hilly, Distance_flat, are collected from Asian Highway Program (UNESCAP).

The provinces located in the south lack mountainous roads with only a small share along roads classified as hilly. The northern provinces Luangprabang, Xayabury and Oudomxay have the largest share of mountainous road length together with Houaphan located in the central parts of the country.

Information illustrated by the map in Figure 5.2 where high elevation can be found in the mountainous northern and northeastern parts of the country and the more flat areas along the Mekong River in the southern parts of the country with freight relates well with the results from the calculation of freight rates in Figure 5.6, Figure 5.7 and Figure 5.8. Figure 5.9 capture the elevation patterns shown in the map in Figure 5.2. The

findings from the analysis of freight rates together with and the geographical composition of the routes from Vientiane to the provincial centers will be used in next section.

5.6 Analysis of the Determinants for National Freight tariffs

This section studies the relationship between quoted freight tariffs between Vientiane Municipality and the provincial centers in Lao PDR in the previous section and a set of determinants in a regression framework. In a first step, the multiple regression analyzes the impact of distance, road quality and market competition on the calculated freight tariff. As a second step in the analysis a simple correlation analysis between the variables in the regression is performed. A new variable illustrating travel time is introduced as proxy for transport costs. The purpose of this last step is to check the relationship between travel time, distance and fuel consumption per kilometer and the dependent variable freight tariff.

5.6.1 Variables and Expected Signs

The theoretical concepts related to calculation of freight rates are not straight forward, as illustrated in Figure 2.3 Determinants of a Transport Tariff. The model used in this analysis uses a limited number of variables identified in the theoretical framework, as it is difficult to operationalize many of the remaining theoretical constructs due to lack of detailed data.

The primary data source for this study is a dataset provided by a private freight transport service provider located in Vientiane. The Company is one of the market leaders in the domestic freight industry at the national level and provides large volumes of freight transport to all provincial centers in Lao PDR. The company provided freight tariffs for both six-wheel trucks and ten-wheel trucks, but this analysis is limited to only six-wheel truck as it is the most common option for domestic freight transport. The resulting freight tariff dataset was divided into a total freight tariff in Kip and the share of expenses for fuel. This dataset was complemented with distance and road quality

measures provided by Department of Roads and UNESCAP Asian Highway Database, and statistics on the number of private firms in each province provided by the Department of Statistics.

The provided data on freight tariffs relates well with costs quoted in ADB 2005a. The evaluation report quotes intra-provincial freight tariffs from Champasack Province based on information from transport of freight between Pakse and Veun Kham (located on the border between Lao PDR and Cambodia) a journey of 152 kilometer on all weather National Road 13 and National Road 13 S. The evaluation report quotes 550 Kip per ton-km for freight transport in the direction Pakse – Veun Kham, which is higher than inter-provincial freight tariffs provided by the transport company located in Vientiane. However, the higher price quoted for the intra-provincial freight in Champasack Province can be explained by economies of scale as the route is shorter and the freight tariff is calculated for all commodities of smaller loads than a 12 tons load.

Table 5.4 provides a list of the variables used in the regression analysis, which is estimated by ordinary least squares (OLS). The dependent variable in the model estimating determinants for freight costs (equation (1) - (4)) is the freight rate between Vientiane Municipality and every provincial center in Lao PDR. This variable expresses the unitary cost in Kip per 6-wheel truck with a shipment of 12 tons. The freight transport service provider charges his client for the shipment to be transported by road to the destination. For every pair of origin and destination, one quotation from a freight transport service provider located in Vientiane Municipality has been obtained. The freight rate has been confirmed by several sources during field research in Lao PDR and said to be accurate and consistent with freight tariffs on the market for domestic freight transport.

The independent variables in equation (1) and their *a priori* expected signs are as follows: lnDistance is defined as the real distance between Vientiane Municipality and provincial center in kilometer and is calculated for each specific destination. Distance in

kilometer is the standard measure used to measure accessibility (Marquez-Ramos 2007). The expected sign of this variable as a determinant of the freight rate costs is positive. The variable lnFuelconsumption is defined as amount of diesel in liter consumed by the six wheel truck with a 12 tons load. The variable is a proxy to capture the quality of the road and the change in elevation on the transported route. Routes with large share of mountainous or hilly roads consume more fuel. An increase in the diesel consumption can be expected to increase the freight tariff.

The explanatory variables in equation (2) are similar to equation (1) with the addition of the variable lnBusiness. The variable is a proxy to capture the degree of competition on the market of the destination. The variable covers all registered businesses in the province of destination. An increase in this variable would cause a decrease in transport costs; hence the sign of this variable is expected to be negative. The number of private businesses established in the province of destination is expected to capture local demand for freight transport services. It may also be interpreted as a proxy for degree of competition on the destination market, since a market with a larger number of private businesses is likely to be home to a larger number of competing transport providers. Put differently, provinces with larger number of registered businesses are likely to demand more freight services, and local companies can thus be expected to provide a higher frequency of freight deliveries and therefore lower ton-km prices, taking into account pure distance and road quality effects. Low frequencies are an obstacle for freight transport service providers operating in a developing country context. Low frequencies together with a low possibility to get return freight on routes to destination without production of commodities to be sold in other provinces or for export provide a higher price. The last central variable added in Equation (3) and (4) is lntraveltime and is measured in hours and used as an alternative to distance to measure the degree of accessibility. Since the distance is highly correlated with travel time (r= 0.943) the distance variable is not included in Equation (3) and (4). The variables are summarized in Table 5.4.

Table 5.4 Variables

Variable	Definition and comments
Dependent Variable	
lnFreight	Log freight rate for 6-wheel truck loaded with 12 tonne in kip from Vientiane Municipality year 2006
Independent Variables	
lnDistance	Log distance in km from Vientiane Municipality to provincial center
lnFuelconsumption	Log consumption of litre diesel per kilometer as a proxy to measure road quality
lnBusiness	Log total number of registered busniess in the province
lnTraveltime	Log travel time from Vientaine to provincal centre in hours

Descriptive statistics for the variables included in Equation (1) to (4) are presented in Table 5.5. The number of observations is the number of provinces which are covered by the transport service operator's freight services. It should be noted that the results from a regression analysis with this low number of observations should be carefully interpreted and the results should be seen mainly as indicators of how the independent variables influence the dependent variable freight tariffs, and as a complement to the calculations provided in previous sections.

Table 5.5 Descriptive Statistics

	lnFreight	lnDistance	lnFuelconsumption	lnBusiness	lnTraveltime
Mean	15.163	6.237	8.422	7.13	2.0602
Std. dev	0.66088	0.48614	0.34043	0.69242	0.51563
No. obs.	16	16	16	16	16

5.6.2 Model Specification

The equations (1) – (4) below illustrate four alternative formulations of the regression model. Since the relationship between freight rates and distance is assumed to

be non-linear, we use a ln-ln form to investigate the strength of the relationship between the variables in the regression. The α is the constant, and β, γ, and δ are the corresponding vectors of coefficients, and ε is a normally distributed random error term.

$$\ln Freight = \alpha + \beta \ln Distance + \gamma \ln Fuelconsumption + \varepsilon \quad (1)$$

$$\ln Freight = \alpha + \beta \ln Distance + \gamma \ln Fuelconsumption + \delta \ln Business + \varepsilon \quad (2)$$

$$\ln Freight = \alpha + \beta \ln Fuelconsumption + \gamma \ln Traveltime + \varepsilon \quad (3)$$

$$\ln Freight = \alpha + \beta \ln Fuelconsumption + \gamma \ln Business + \delta \ln Traveltime + \varepsilon \quad (4)$$

5.6.3 Analysis

The results for the regression models are presented in Table 5.6. All regressions use lnFreight as the dependent variable. Equation 1 uses only two independent variables, distance and fuel consumption, while Equation 2 adds the number of businesses registered in the province of destination. A first observation is related to the signs of the coefficients. By construction, an independent variable with a positive coefficient is posited to raise the likelihood that the freight tariff increases. Since the dependent variable is in ln form, the estimated regression coefficients measure the percentage change in freight rate within the province from a unit change in the independent variable. The results indicate that distance and fuel consumption both have a positive influence on the freight tariff, as expected. It should be noted that all estimated coefficients are significant at conventional levels.

The variable number of businesses is added to Equation 2 in order to capture the role of competition and demand for freight at the destination of the freight, with an expected negative sign. Economies of scale and higher competition should provide a lower price of transport. This expected impact is confirmed by the significant negative coefficient estimate for the (ln) number of business variable, suggesting that not only distance and road quality influence the freight tariffs between Vientiane Municipality and the provincial centers. The R^2 increased slightly with the inclusion of the variable lnBusiness, from 0.981 in Equation 1 to 0.987 in with lnBusiness in Equation 2. The coefficient of the variable lnBusiness is negative and significant at a five percent level, pointing towards the hypothesis that this variable is a proxy for competition, since a higher number of private businesses in a province reduce transport costs.

Table 5.6 Regression Results (dependent variable ln freight tariff)

	1		2		3		4	
Constant	1.578	**	3.112	***	8.499	***	10.352	***
	(2.434)		(3.836)		(7.307)		(8.297)	
lnDistance	1.048	***	0.985	***	-		-	
	(19.038)		(18.772)		-		-	
lnFuelconsumption	0.837	***	0.784	***	0.538	***	0.476	***
	(10.639)		(11.352)		(10.596)		(3.707)	
lnBusiness	-		-0.098	**	-		-0.159	**
	-		(-2.547)		-		(-2.439)	
lnTraveltime	-		-		1.034	***	0.941	***
	-		-		(3.642)		(10.297)	
R-squared	0.981		0.987		0.942		0.961	
No. of observations	16		16		16		16	
F-ratio	328.573	***	313.687	***	105.297	***	98.906	***
Degree of freedom	13		12		13		12	

Note: * - significant at a ten percent level; ** - significant at a five percent level; *** - significant at a one percent level. T-values in parentheses.

Equation 3 and 4 utilize travel time in hours instead of distance in order to test the sensitivity of the results and compare the variable travel time with the variable distance. Interesting to note is that the estimations using travel time show somewhat weaker results for the Fuel consumption variable: this is due to the fact that travel time captures some of the variation in road quality that is also reflected by fuel consumption.

Table 5.7 Correlation Coefficients Matrix

	lnFreight	lnDistance	lnFuelconsumption	lnTraveltime
lnFreight	1.00	0.901**	0.663**	0.939**
lnDistance	0.901**	1.00	0.253	0.943**
lnFuelconsumption	0.663**	0.301	1.00	0.478
lnTraveltime	0.939**	0.943**	0.478	1.00

Note: ** - significant at a five percent level.

The correlation coefficients in Table 5.7 provide empirical evidence for the high correlation between lnFreight and lnTraveltime (R^2=0.939). The correlation between lnFreight and lnDistance is similarly high (R^2=0.901). This result provides important insights about which variables that can be used as a substitute or proxy for freight tariffs. Martinez-Zarzoso & Nowak-Lehmann (2007) analyze the relative importance of road transport costs in comparison with distance measures as determinants for trade flows and evaluate the importance of different factors influencing transport costs of maritime and road transport. The results indicate that transport conditions are the most important determinant for both modes, whereas quality of service is also very important for maritime transport, and transit time is also very important for road transport. Their results are consistent with the results in the regression analysis conducted here.

5.7 Summary and Conclusions

The particular concern of this chapter has been twofold; first to describe the structure of the freight transport service sector in Lao PDR and secondly to analyze the freight transport costs in the country. The chapter began to describe the freight transport service sector as outlined in the first guiding research question for Chapter 5 focused on

exploring the main actors in the domestic freight transport service sector and their operative administrative and spatial levels. The main finding from this part of the investigation can be summarized as follows: the results from the qualitative analysis indicate a fragmented national market for freight transport. Actors do not often provide services on other administrative and spatial levels than where they are located, with the exception of the larger firms located in the capital Vientiane serving the national market with freight transport services. This might decrease the competition on the overall market as the administrative and spatial levels acts as informal barriers.

The findings showed the low demand for transport for certain parts of the country provide higher freight transport costs on the route from Vientiane to the province of destination as the freight transport service providers located in Vientiane providing services to the whole country rarely obtain cargo on the return trip i.e. on the route from the province of destination to Vientiane. However, smaller freight transport service providers located in the provinces having more flexible operations and lower fixed costs can obtain cargo on their return trip from Vientiane to their province of origin as they can afford waiting for return cargo in Vientiane.

In the second part of the chapter a more detailed study of the freight rates was carried out. It is useful to recall the second guiding research question for Chapter 5: *How are freight tariffs for domestic freight transport services determined with reference to the geography and regional development of the country?*

The empirical investigation from this chapter shows that the national road transport system is relatively well integrated. However there are provinces located off the large national roads on higher altitude that experience high freight costs compared with provinces located in on lower altitude.

This chapter tested a regression model that tried to take into account other factors than only distance that influence domestic freight tariff in Lao PDR. According to our regression models analyzing the results indicate that fuel consumption as a proxy for road

quality, distance to measure accessibility, and number of private business located in the province of destinations are all significant and have an impact on the freight tariff charged. This result provides evidence to the importance of the market characteristics of the transport system. The development of the freight transport system is not only dependent on physical infrastructure but also on a well developed market for freight transport which was described and analyzed in the first part of the chapter .

Interesting to note is that travel time in hour is highly correlated with distance and can be used as a substitute to distance in the regression analysis. Moreover, the variable travel time is also highly correlated with freight tariff which is an important finding.

6. Domestic Market Integration in Lao PDR

6.1 Introduction

The traditional theoretical view suggests that an improvement in the transport infrastructure that reduces transport costs stimulates greater demand, providing enhanced economies of scale and initiating a process of cost reductions and sales growth as the market area expands. In addition, lower transport costs (through shorter transport times and lower vehicle operating costs) enable firms to sell their products at lower price. The reduction in transactions costs lowers barriers to entry in sales and distribution, which tends to raise the number of market actors, raising competition and lowering mark-ups, with further reductions in consumer prices as a result. This implicitly assumes rational economic agents in a economic system where market supply and demand determine prices and a transport service sector providing efficient, effective and predictable services. The focus in this discussion has often been on the increased efficiency in a market system that follows from lowering transport costs, together with a higher degree of connectivity between geographically scattered local and provincial markets.

There are four key elements affecting market integration in Lao PDR:

- landlockedness creating a dependency on transit routes through neighboring countries;
- a geographically scattered population;
- high dependence on subsistence agriculture;
- an insufficient transport infrastructure impeding integration of scattered local and provincial markets.

To alleviate the negative impact of these characteristics on economic development, large investments in transport infrastructure have been carried out as presented in Chapter 5.

Transferring retail products through a complex market system does not only require a transport network but also individual traders who are willing to accept the risks associated with trading on distant located markets. A complex network of retail markets is emerging in Lao PDR, despite high transport costs and substantial uncertainty due to the low quality of existing transport infrastructure and the shortage of transport services. These emerging retail markets supply a wide variety of products to rural areas (Andersson *et al* 2005; LECS 3 2003). The relationship between markets can be studied through the mapping of spatial price patterns. If the market system is integrated and works well, prices on individual markets should tend to converge, and differ mainly because of transport costs (including other costs of trading). In weakly integrated market, the dispersion of prices can be expected to be larger because of differences in local market characteristics, for example the nature of competition at the local level, population size, and income levels of the households in the area covered by the market (Christaller 1933; Badiane & Shively 1998). If markets are well integrated, these differences will tend to disappear as a result of arbitrage.

A better understanding of the nature of spatial statistical models has three potential advantages. First, it will highlight the relationships between known processes in geography, socio-economic analysis and market research and any other field that may face large sets of problems with spatially dependent data. Therefore, it will assist decisions in applications of location, and order of neighborhood structures. Secondly, it will force the researcher to pay more attention to the careful selection of appropriate models which incorporate a spatial dimension. Presently, many researchers are tempted to use simple measures and simple models to make data processing more tractable. A frequent consequence of this is that crucial expert knowledge about the spatial pattern-process relationships are ignored or neglected as in the neoclassical view on economic integration and/or transport services as discussed in Chapter 2. Therefore, thirdly, more challenging and more focused questions would be posed when developing statistical models.

An application of existing models using statistical data conducted by Minten & Kyle (1999) demonstrate the effect of distance and road quality on food collection and marketing margin with data from Zaire. The study show that transportation costs have a major impact on regional differences on food prices and that quality of roads is an important factor in the transportation costs. Moreover, considerable attention has been focused on the relative isolation of rural markets and the implication of this isolation for agricultural producers and consumers (e.g. de Janvry *et al.* 1991; Fafchamps 1992). However few attempts have formally linked the spatial price patterns of homogenous retail product with village characteristics such as location, size, expenditure, transport costs and competition on local markets in a context of a developing country. Examples can be found from Sweden where Asplund & Friberg (2002) examine retail grocery price levels across a large panel of stores in Sweden. Their results indicate that variation in prices can be attributed to store-specific factors such as size and affiliation to a chain of supermarkets. Several studies have examined the impact of market structure on retail pricing using U.S. data; Cotterill (1993) provides a survey. The studies make use of variation in prices across geographical markets. In almost every case, the number of observations is quite limited, price indexes for areas rather that store-level prices are used, and markets definitions are broad. Some examples can be illustrative of the problems and results when conducting these types of studies. An often-cited study by Cotterill (1986) uses a cross section of prices of a product basket from 35 supermarkets in rural Vermont. The findings suggest that prices are high where supermarket concentration is high. Newmark (1990) questions the validity of the literature with the reason that it had not controlled for regional difference in income and that the studies used small non-random samples. Controlling for income, and with data on the price of a basket of goods in 14 cities across the U.S. and the 13 cities in Florida, he are not able to find any correlation between chain concentration and price levels. Claycombe & Mahan (1993) regress a price index of beef to market structure and also find little in terms on correlation. Marion (1998) relates the rate of change in a price index from 15 U.S. metropolitan to the presence of warehouses, and finds lower price increases where their

market shares are increasing. In the literature on demand analysis in developed countries, almost all of the identifying price variation has come from price changes over time, with little attention paid to variation in prices over space. The reason for this can be explained by the fact that most developed countries where transport and distribution systems are highly developed, and where transport costs are relatively low, there is little price variation between localities at any given time. However, in developing countries, transport is often more difficult, markets are not always well integrated (Deaton, 1997).

To study the process of integration of the domestic market in Lao PDR, the spatial variation in beer prices and its relationship with travel times as a proxy for freight rates for domestic freight transport is examined. More specifically, local prices per 640 ml bottle of Beer Lao is examined, which, at the time of data collection, was a homogenous retail product manufactured only in one location in Lao PDR[9]. The rationale behind using a manufactured retail product as the study object is that the production of the good is not dependent on the local context where is it consumed. The pricing of locally produced agricultural goods sold in local markets is dependent on various local factors such as fertility of land, climate, access to irrigation, usage of pesticides and fertilizers, and the quality of products (Deaton 1988). Focusing on a homogenous manufactured retail product manufactured in one location only allows us to abstract from many of these local determinants and concentrate on the impact of transactions costs and market conditions.

The following paragrahps present the data and descriptive statistics used in the analysis.

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[9] At the time, only one type of bottled Beer Lao was marketed in Lao PDR. More recently, Beer Lao has focused on diversification: in addition to the lager beer referred to in our analysis, the company now markets a dark beer as well as light (low alcohol) beer.

6.2 Data and Descriptive Statistics

The empirical parts of the study are based on a micro-level dataset on Lao households, the Lao Expenditure and Consumption Survey from 2002/2003. This survey provides detailed data on the expenditure, consumption patterns of households and price information on a large number of commodities. It covers all provinces, with each provincial sample stratified into urban areas, rural villages with road access, and rural villages without wet season road access. The sample consists of 8100 households selected through a two-stage sample design. A random sample of villages was selected in the first stage. The villages were stratified on eighteen provinces and within provinces on urban/rural sector. The rural villages were further stratified on villages with "access to road" and "no access to road". The total first-stage sample consists of 540 villages. 15 households were selected with systematic sampling in each village, giving a sample of 8100 households.

The number of villages (Primary Sampling Units) in the sample is 540 with 397 villages reporting prices of a bottle of Beer Lao[10]. The analysis of prices distinguishes between several geographical areas. Three spatial levels are used; the four geographical regions – South, Central, North, and Vientiane Municipality, the interaction between the captial Vientiance and all provincial centers and lastly the interaction between the provincial centers and villages located in the province. In addition, the author separate between urban and rural prices, and take into account village characteristics such as road access, quality of road access, markets, and transport services as possible determinants of price differences.

Economic reforms in Lao PDR seem to contribute to favorable outcomes in terms of lower poverty rates and high levels of expenditure by permitting greater participation

[10] A sample of 397 villages is used for the descriptive analysis. For the regression analysis the sample cover 378 as several villages lacked information of more than 2 independent variables.

in both local markets and markets in neighboring countries as discussed in Chapter 4. The majority of the poor in Lao PDR lives in rural areas and depends on subsistence level agriculture. Limited availability of resources, agricultural land, physical productive assets, livestock, number of dependents in households and lack of access to physical and social infrastructure (Andersson *et al* 2005; Richter *et al* 2005).

However, Warr (2005) illustrates in his analysis of LECS2 and LECS3 the importance of road development with the purpose to provide all year around access to markets and connectivity between provinces. His results indicate that there are limited opportunities to participate on the free market without physical access to roads and markets. This seems to be of special importance during the wet season when many roads are impassable due to flooding. Geographical factors such as location, distance to markets, and road accessibility naturally have a significant impact on the costs of intermediate and final goods. The following section will provide descriptive statistics using beer retail prices in relation to a selction of market variables.

6.2.1 Market Access and Road Access Price Levels

Mapping the variation of prices between village markets based on survey data can provide an overview of the integration/fragmentation of the domestic market. The interaction between markets and the distribution of goods for sale in local markets are dependent on both physical transportation networks and transport service providers. Table 6.1 presents descriptive data on village access to markets and characteristics of road access at the national and regional level.

Table 6.1 Market Access Characteristics

Region	**Village Markets, Share of Villages**	
	Daily	Daily or occasional
Vientiane	27.2	29.2
Central	7.3	9.6
North	8.4	12.8
South	7.4	10.2
Lao PDR	**9.5**	**12.7**

Source: Author's calculations based on LECS-data.

Market access is one of the factors influencing price levels. Only 9.5 percent of the villages at the national level in the sample from LECS 3 report having a regular daily market in the village. The market access rises to 12.7 percent if occasional markets are included. Villages located in Vientiane Municipality are well covered by markets, which can be explained by the area's urban structure. The other regions report significantly lower coverage of daily markets. When expanding the definition of market access to also account for occasional markets, there is a slightly higher coverage across the board. Occasional markets seem to have a larger importance in the North than in other parts of the country.

The variability in the quality of the road infrastructure, over time and space, is an important determinant of spatial price differences as these factors influence transport costs. Poor quality and seasonal differences in road access have direct effects on transport costs and time required to reach the villages, and will therefore raise prices of retail products. The road conditions in Lao PDR differ according to seasonal changes in weather, as seen in Table 6.2. Road access during the dry season is considerably higher in all regions. At the national level, 61 percent of the villages in the studied sample have all season access to a road. Another 14 percent of villages have dry season access only. Unsurprisingly, road access is best in Vientiane Municipality and the Central region, and weakest in the North.

Table 6.2 Road Access Characteristics

Region	**Road Access, Share of Villages**	
	Dry season	All Seasons
Vientiane	100	100
Central	88.2	70.2
North	54.7	43.8
South	77.8	61.1
Lao PDR	**74.5**	**61.1**

Source: Author's calculations based on LECS-data.

The regional differences between villages regarding access to roads are significantly higher than the regional differences between villages regarding access to markets. Access to markets can still be considered a rare facility in large parts of Lao PDR. Yet, it is important to note that the absence of a market does not mean a fully self-sufficient livelihood, as very basic retail products are marketed by small individual village shops. The market can be seen as an agglomeration of suppliers that provides a larger variety of marketed products. The larger number of suppliers is also likely to provide competition and lower prices, since it tends to reduce the market power (and profit margins) of the individual suppliers or traders.

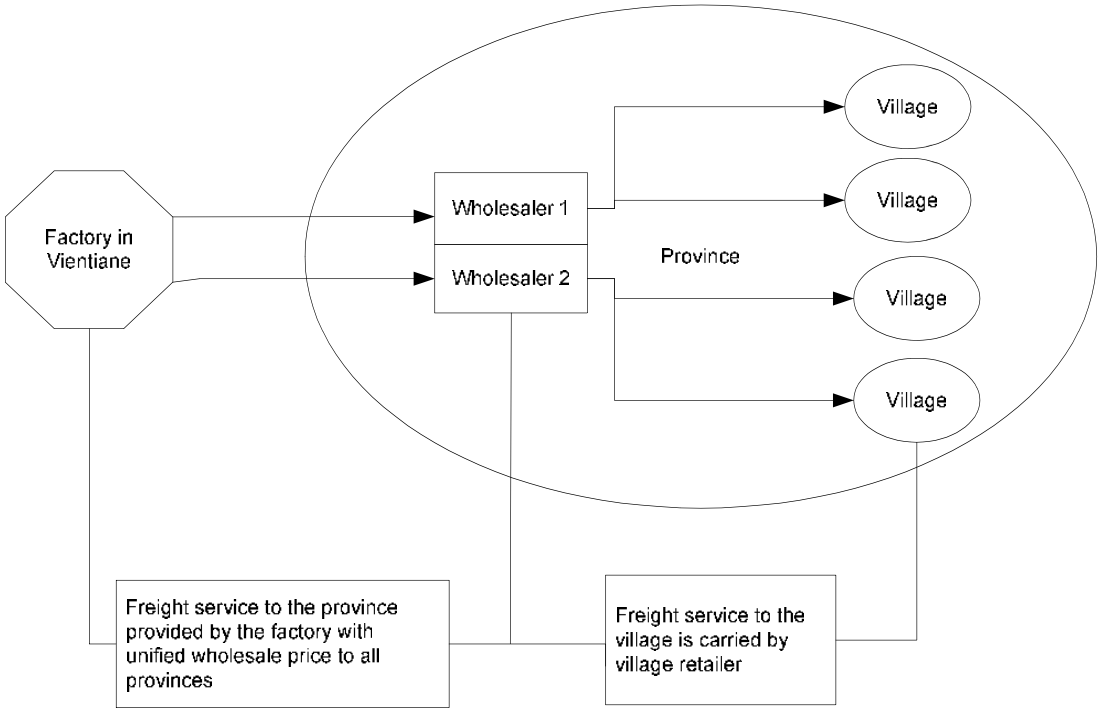
6.2.2 Spatial Price Variation

To examine spatial price variations, the price of a domestically manufactured retail product, namely a 640 ml glass bottle of Beer Lao is studied. This product is only produced at one location in Vientiane Municipality and transported and sold to all parts of Lao PDR. The market for beer in Lao PDR at the time of the LECS surveys could be characterized as a monopoly market with only one marketed beer brand. The company had specially assigned dealers in the provinces that provided distribution to within their respectively province.

The framework of analysis are developed using Beer Lao distribution system in order to reflect the actual domestic value chain of the product. It is important to understand the basic characteristics of the distribution system. The distribution of Beer

Lao occurs through an extensive distribution network as shown in Figure 6.1. The beer is produced in Vientiane. In Vientiane Municipality Lao Brewery delivers directly to retail outlets through trucks owned by the company. In the provinces Lao Brewery contracts 3 trucking companies. The distribution is divided into three regions; Northern, Central and Southern. The trucking delivers to the provincial agencies who in turn distribute to the retail outlets. The company covers the transport costs of deliver the beer to the provincial wholesalers. There are always at least two provincial agencies in each province in order to avoid a monopoly market situation. The distribution of beer is approximately 50/50 between Vientiane and the provinces. The distribution network is represented below.

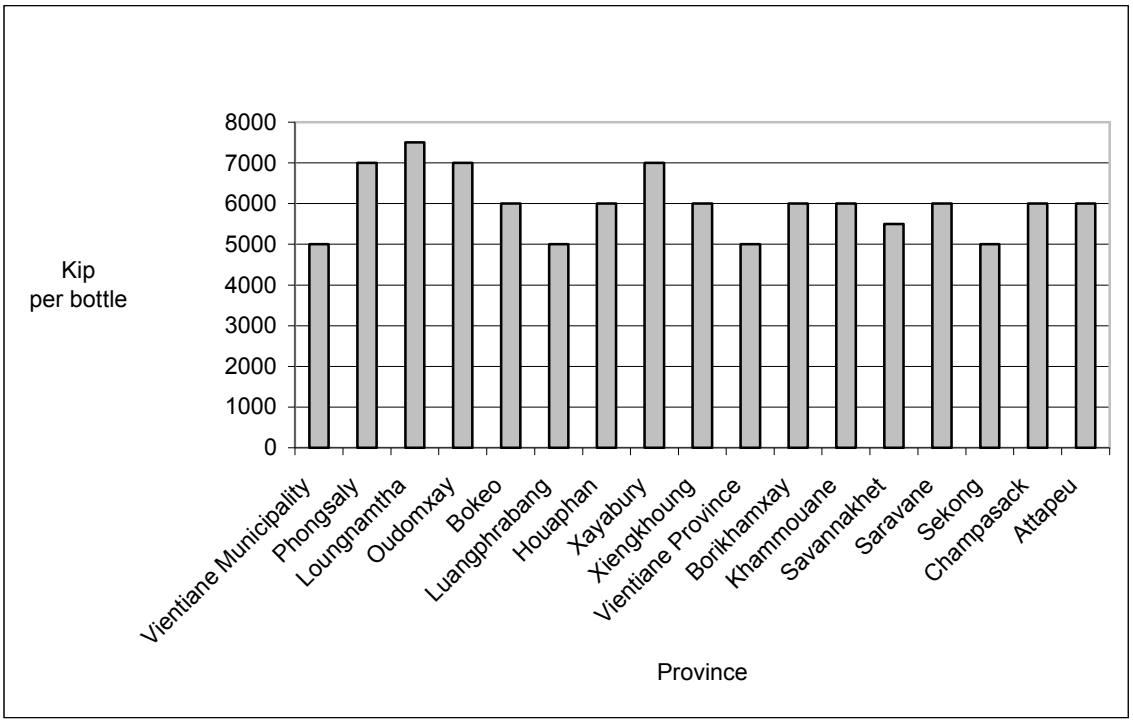
Figure 6.1 Beer Lao Distribution System



Source: Author's figure based in interviews with marketing department at Beer Lao.

The provincial agencies are private companies who are contracted to Lao Brewery to sell to the retail outlets. The wholesale price of beer is controlled by the company and the agencies cannot increase their prices greater than 15 percent of what they buy from Lao Brewery. However, retailers in villages are allowed to set their prices depending on supply and demand. Thus provides a rather uniformed price band on the provincial wholesale market.

Figure 6.2 Average Retail Price of Beer in Provincial Centers, Kip per Bottle



Source: Author's calculations based on LECS-data.

The first step in the analysis is to compare the retail price per bottle of Beer Lao in the provincial centers, as presented in Figure 6.2. The lowest prices are found in Vientiane Municipality, Luangphrabang, Phongphong (which is the provincial center of

Vientiane Province) and Sekong in the South, which all exhibit a price per bottle of approximately 5000 Kip.

This finding gives as indication of other factors apartment for the transport costs. Luangphrabang is located 397 km from Vientiane Municipality (see Table 6.3), but the price is the same as the retail price in the two closest located markets, Vientiane Municipality and Phongphong in Vientiane Province. Despite the distance, Luangphrapang dealers are able to serve their markets with the same price as the dealers located next to the production site in Vientiane, presumably because of the heavy competition in that location. This suggests that physical transportation costs make up a relatively small share of the beer price in Luangphrabang and Sekong. Loung Namtha's provincial center Namtha exhibits the highest price per bottle at Kip 7500 with Oudomxay, Xayabury, and Phongsaly, all located in the North, recording about Kip 7000 per bottle.

Table 6.3 Distance from Vientiane to Provincial Centers

Provincial center	Province	Distance from Vientiane Municipality in km	Price of one bottle Beer Lao in Kip
Sisattanak	Vientiane Municipality	0	5000
Phongsaly	Phongsaly	747	7000
Namtha	Loungnamtha	644	7500
Xay	Oudomxay	605	7000
Houayxay	Bokeo	811	6000
Luangphrabang	Luangphrabang	397	5000
Xamneua	Houaphan	629	6000
Xayabury	Xayabury	508	7000
Pek	Xiengkhoung	435	6000
Phongphong	Vientiane Province	153	5000
Pakxanh	Borikhamxay	154	6000
Thakhek	Khammouane	354	6000
Khantabouly	Savannakhet	487	5500
Saravane	Saravane	649	6000
Lamarm	Sekong	812	5000
Pakse	Champasack	685	6000
Xaysetha	Attapeu	847	6000

Source: National Geographic Department 2005, LECS 3 and MPWT.

Countries like Lao PDR with large differences in quality of road infrastructure and markets access does not only exhibit a large variation in transport costs but also in retail prices. As shown in Figure 6.1, there is a 50 percent difference in the average retail price per bottle between the provincial center of Xayabury and Luangaphrabang, which are located only 111 km apart: this large price gap probably reflects high transactions costs due to difficult transport conditions.

One interesting conclusion from the retail price comparison between provincial centers is that the distance between producer and consumer is not a good predictor of the price of consumer goods. In addition, already this very rough price comparison suggests that it is necessary to account for differences in transport costs emanating from uneven road quality, as well as differences related to the degree of competition (or the number of traders) in each location.

The next step is a regional descriptive analysis using means and standard errors of the price data based on differences in village characteristics: the analysis distinguish between urban villages, rural villages with access to roads, and rural village without access to roads. Looking first at the pattern at the national level, the results are as expected (see Table 6.4), with the lowest prices in urban villages and the highest prices in rural villages without road access.

Table 6.4. Price and Standard Error of one 640 ml bottle Beer Lao.

Vientiane				
Urban village	Mean (in Kip)	5348	Max. (in Kip)	6500
	Std. Error	79.9	Min. (in Kip)	5000
Rural village with access to road	Mean	5654	Max.	7000
	Std. Error	173.48	Min.	5000
				n= 46 villages
Central				
Urban village	Mean	6138	Max.	8000
	Std. Error	140.1	Min.	5000
Rural village with access to road	Mean	6905	Max.	10000
	Std. Error	117.6	Min.	5000
Rural village without access to road	Mean	8103	Max.	12000
	Std. Error	286.6	Min.	6000
				n= 159 villages
North				
Urban village	Mean	6696	Max.	8000
	Std. Error	177.1	Min.	5000
Rural village with access to road	Mean	7714	Max.	12500
	Std. Error	166.0	Min.	5000
Rural village without access to road	Mean	7810	Max.	10000
	Std. Error	254.1	Min.	6000
				n= 111 villages
South				
Urban village	Mean	6233	Max.	8000
	Std. Error	200.4	Min.	5000
Rural village with access to road	Mean	7309	Max.	13000
	Std. Error	169.7	Min.	5000
Rural village without access to road	Mean	8000	Max.	12000
	Std. Error	315.3	Min.	6000
				n= 81 villages
Lao PDR				
Urban village	Mean	6020	Max.	8000
	Std. Error	86.14	Min.	5000
Rural village with access to road	Mean	7155	Max.	13000
	Std. Error	86.49	Min.	5000
Rural village without access to road	Mean	7986	Max.	12000
	Std. Error	164.51	Min.	6000
				n= 397 villages

Source: Author's calculations based on LECS-data.

Turning to the regional level, the lowest average prices (Kip 5348 per bottle) and the lowest standard error are found in urban villages in Vientiane. Urban villages in the

North record higher prices than urban villages in the South, which presumably reflects differences in transportation distance from Vientiane. Road access also has a strong impact on both the mean and the standard deviation of prices. Rural villages with access to roads (in particular, those with wet season road access) have lower average prices than rural villages without road access. The standard deviation of prices is also lower, suggesting that there are relatively few villages where traders are able to use their market power to raise prices: the access to road transportation means that the market is contestable, i.e. that a competitor may enter if the profit margin begins to grow. In rural villages without road access, the entry barriers are higher, which presumably gives more market power to traders and contributes to wider dispersion in prices, depending on demand and other market conditions. Comparing rural villages without road access, it can be seen that the highest average prices as well as the highest standard deviations are recorded in the Central and Southern parts of the country. This indicates either that the transportation costs to these villages are higher and vary more than in the North, or that competition is lower than in the North, or a combination of the two.

Table 6.5 illustrates the importance of competition by comparing prices in villages with and without markets. The presence of a market, where several sellers are likely to compete for customers, clearly reduces both the average price and the standard deviation of prices. It was already noted that weaker competition could account for the higher prices in rural villages without road access. This is confirmed in Table 6.5, which shows that none of the sampe villages without road access has a market.

Table 6.5. Price and Standard Error of one 640 ml bottle Beer Lao and Access to Markets

Lao PDR				
Urban village	With market or occasional	Mean (in Kip)	5990	
		Std. Error	86.7	n=96
	Without market or occasional	Mean	6750	
		Std. Error	478.7	n=4
Rural village with access to road	With market or occasional	Mean	7143	
		Std. Error	87.2	n=212
	Without market or occasional	Mean	7313	
		Std. Error	442.2	n=16
Rural village without access to road	With market or occasional	Mean		
		Std. Error		
	Without market or occasional	Mean	7985	
		Std. Error	164	n=69
Total number of villages are 397				

Source: Author's calculations based on LECS-data.

Market size can also be assumed to influence the price pattern. Large villages should exhibit lower prices, since they should attract a larger number of sellers. Table 6.6 shows the national price variation depending on the type and size of the village. Villages are divided into; large villages, with more than 50 households; and small villages, with fewer than 50 housholds. The expected pattern, with a lower price in large villages, holds for urban and rural villages with road access, but not for rural villages without road access. This is very interesting, and suggests that the entry barriers for traders acting in villages without road access are quite high. The fact that larger villages without road access record higher prices indicates that they do not attract more sellers: instead, it is likely that the incumbent seller just meets more demand which allows him or her to raise prices. In these cases, improved road access would not only result in lower prices because of the reduction in transport costs, but also because of the reduction in entry barriers and the marker power of traders.

Table 6.6 Price and Standard Error of one 640 ml bottle Beer Lao in Small and Large Villages

Lao PDR				
Urban village	Large village	Mean (in Kip)	5979	
		Std. Error	86.00	n=96
	Small village	Mean	7000	
		Std. Error	408.25	n=4
Rural village with access to road	Large village	Mean	7069	
		Std. Error	92.42	n=190
	Small village	Mean	7584	
		Std. Error	226.25	n=38
Rural village without access to road	Large village	Mean	8083	
		Std. Error	208	n=48
	Small village	Mean	7762	
		Std. Error	257	n=21
Total number of villages are 397				

Source: Author's calculations based on LECS-data.

Note: Definition of a Small village is a village with less than 50 households and Large village more than 50 households.

The free flow of products between markets is of great importance for the functioning of any economy. An integration of markets, supported by improvements in market infrastructure and transportation systems, can reduce transaction costs and allow trade between locations, with gains from comparative advantages and specialization. The descriptive analysis of beer prices indicates that transport costs in Lao PDR are not only determined by distance. Road access and the presence of markets are important determinants of prices at the village level.

The high average prices and large price variations between villages without access to a road are likely to reflect a high variation in transportation costs and competition. The prices are high not only because it is expensive to transport Beer Lao to villages lacking road access, but also because there is not likely to be much competition between traders. Given the high entry barriers (in terms of transport costs) the markets are too small to support several traders, and the incumbents can therefore charge high

profit margins. This suggests that the benefits of improvements in transport infrastructre can be very substantial, extending far beyond the cost savings related to transport costs. By making the local markets constestable, transport investments can contribute to a reduction in the cost of imported products. However transport infrastructure alone can not bring down the observed fragmentation of prices. Minten (1999) results from Madagascar that soft infrastructure and competition also have an influence on prices.

At the same time, it is important to note that the increased efficiency related to the inflow of goods to villages benefitting from improved transport infrastructure reflects only part of the overall increase in welfare. Stronger links to the national (and perhaps even the international) economy will not only affect the expenditures but also the earnings of local households. It is likely that the prices of the goods produced by local households may increase, since less is lost in transport costs and profit margins charged by traders with market power. Goetz (1992) and de Janvry *et al.* (1991) argue that due to transaction costs, a specific price band exists when following a product between its purchase and selling price - the poorer the infrastructure, the greater the size of the band. The descriptive statistics above provide evidence for transport and market infrastructures influence on spatial price patterns.

The following part of the chapter will provide an in-depth analysis of the spatial price patterns using regression analysis estimated by ordinary least squares (OLS). The purpose of the section is to study the determinants of the beer retail price on a national level. The number of observation does not allow us to obtain results based on the categories i.e. urban village, rural village with access to road and rural village without access to roads, used in the descriptive statistics above.

6.3 Estimation Methods and Model Specification

The coefficient estimates that form the basis for the economic analysis of the determinants for beer retail prices in villages in Lao PDR are obtained for a series of models that incorporate increasing complexity in terms of spatial variability. This

complexity was warranted by the outcome of specification tests at each stage of the analysis. The estimations starts with a standard regression model, using beer retail price as dependent variable with a selection of variables which are supposed to influence the dependent variable, estimated by ordinary least squares (OLS). Next is the same specification (Equation (1)) but with clustered standard errors where each province is clustered individually, again estimated by OLS. Clustered standard errors incorporates groupwise heteroskedasticity (non-constant error variance) corresponding to the unique character within the individual provinces. Third is using clustered standard errors where each province is clustered individually, again estimated by OLS but with bootstrapping.

The models (1) – (3) below are based on Equation (1) illustrates the relationship between the beer retail price and the independent variables. The α is the constant, and β, γ, δ, ζ, η, θ, ι and κ are the corresponding vectors of coefficients, and ε is a normally distributed random error term.

$$\text{Beer\_retailprice} = \alpha + \beta\text{wholesaleprice\_province} + \gamma\text{distance\_provincial\_center} + \delta\text{male\_wagelevel} + \zeta\text{agriculture\_land} + \eta\text{population} + \theta\text{traveltime\_border} + \iota\text{traveltime\_province} + \kappa\text{daily\_market} + \varepsilon \quad (1)$$

Model 1: Equation 1 OLS regression

Model 2: Equation 1 OLS regression with clustered standard errors. Each province clustered individually.

Model 3: Equation 1 OLS regression with clustered standard errors. Each province clustered individually with boot strapping.

6.4 Independent Variables

The following paragraphs outline the specific independent variables of the models. The choice of variables has been guided by an effort to avoid highly correlated variables that would introduce multicollinearity. This is necessary to make it possible to distinguish the individual contribution of each factor.

The independent variables in equation (1) and their *a priori* expected signs are: wholesale price province defined as the wholesale price charged by the contracted provincial wholesaler of Beer Lao. Wholesale price is expected to hold a positive sign as a higher wholesale price is expected to provide a higher retail price in the village where the beer is sold.

Distance to provincial center is the real distance in kilometer between the provincial center and village of observation. Distance in kilometer is the standard measure used to measure accessibility. The expected sign of this variable as a determinant of the freight rate costs is positive as longer transport provide higher price.

The variable male wage is defined as the level of wage in monetary units in Kip per day a male person earns if he is hired working in the village. The variable is a proxy to capture income levels from earning wage at a local labor market within the village. The opportunity to earn wage outside the self-sufficient agriculture is supposed to have a positive impact on price thus provide higher price of beer.

The purpose of the variable agricultural land in unit hectare is a measure to capture the economic size of the local economy as most villages in Lao PDR are dependent on self-sufficient agriculture. Their income is dependent on the size and productivity of the cultivated land and is expected to hold a positive sign. Andersson *et. al* (2005) found in their study of LECS 3 that size of land is an important determinant of expenditure level where access to land is positively related with expenditure.

Population measure the market size with a negative expected sign as a large market with many customers provide higher competition thus lower retail price.

Travel time to border measure the time it takes to travel to the closest border. This variable is a proxy for the possible access to a foreign beer as a substitute to the locally produced Beer Lao. The variable are estimated from a GIS based model which calculates travel time in hours from any place to another within the country taking into account road infrastructure, road condition, slope, elevation, land cover to travel through, rivers, etc. This model[11] it is possible to calculate how much time it takes to travel from every provincial center to any place in the province and vice versa. Travel time to border is expected to hold a negative sign as competition from imported brands is expected to provide a lower price. It is important to note that during the period in the study, the import of beer was prohibited and it was prohibited to sell beer produced in other countries on local markets. This notwithstanding, beer produced in China was found on local markets located in the northern parts of the country, but business owners often took care to hide the product as sales were forbidden by authorities. The Chinese beer found on local markets was slightly cheaper than Beer Lao: however, retailers stated that Beer Lao was more popular and more frequently sold even though it was more expensive.

Travel time in hours to provincial center is a proxy to capture the quality of the road and change in elevation on the route between the observed village and the provincial center where the wholesaler is located. Routes with large share of mountainous or hilly roads consume more fuel relative to routes with lower change in elevation. The variable is also an outcome from the above described GIS-model. Chapter 5 analyzed determinants of freight rates and found strong correlation between travel time and freight

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[11] The author is grateful to Peter Messerli and Andreas Heinimann from Swiss National Centre of Competence in Research (NCCR) North – South in Berne Switzerland for sharing data from the GIS-model. The model was part of the joint project entitled Socio-Economic Atlas and Poverty Maps for the Lao PDR from where the Socio-Economic Atlas of Lao PDR (Messerli *et al.* 2008) was published.

rate. The result provides a second reason to use travel time in our present model, travel time can be used as a proxy for freight costs. The longer it takes to travel from the village to the provincial center the higher is the freight rate of transporting goods to the village from the center. An increase in travel time can be expected to raise the retail price for beer thus should give a positive sign.

Table 6.7 Variables and Definitions

Variable	Definition and comments
Dependent Variable	
Beer Price	Retail price of one bottle Beer Lao in Kip observed in village from LECS
Independent Variables	
Wholesale price province	Wholesale price of one bottle Beer Lao in Kip in province centre
Distance to province center	Distance in km from village to province centre from GIS-model
Male wage level	Observed male wage level in village Kip per day from LECS 3
Agricultural land	Common agricultural land in village estimated in hectare from LECS 3
Population	Number of person in village from LECS3
Travel time to border	Travel time to closest border in hours from GIS-model
Travel time to province center	Travel time to province centre in hours from GIS-model
Daily market	1 if village have access to a daily market; 0 otherwise from LECS 3

The access to a daily market is a proxy for the level of development of the market economy in the village. A daily market is a hub for economic interaction often with several retailers thus giving local competition. Higher competition between retailers is

expected to have a negative impact on the price levels. This variable is expected to hold a negative sign.

The independent variables in Model (1) are similar to both Model (2) and (3). The variables are summarized and defined in Table 6.7.

6.5 Analysis

Table 6.7, presents the coefficient estimates of the three regression models based on equation (1). The method of estimation used is ordinary least squares. The results obtained from the regression models show some interesting relations between variables. A first comment concerns the fit of the model. All three models are estimated with an R^2 of about 0.42 based on a sample of 387 villages, but with different estimations of the coefficients of the various independent variables. Other studies estimating determinants to spatial price patterns in Africa show similar results. Minten & Kyle (1999) study decline in agricultural prices and the cost of transportation in former Zaire. Their study shows that transportation costs explain most of the spatial difference in price of agricultural prices. Minten (1999) estimates determinants of market access and prices using regression analysis with producer prices of rice as a dependent variable for villages in Madagascar. The study makes use of price observations from 188 villages and obtains an R^2 of 0.309, which is considerable lower than the results obtained in the present study. However, the independent variables are divided into transport costs, transactions costs and rents, with transport costs as the most important determinant of differences in producer price levels. The distance to the main paved road and the quality of the road infrastructure connecting to the main road were found to be significant determinants of producer prices for rice.

Table 6.8 Regression Results (dependent variable beer retail price in village)

Constant	3363.548	***	3363.548	***	3363.548	**
	(6.49)		(3.44)		(2.47)	
wholesale price province	0.596	***	0.596	**	0.596	***
	(7.29)		(3.82)		(2.69)	
distance to province capital	3.717	***	3.717	***	3.717	**
	(3.06)		(2.27)		(2.46)	
male wage level	-0.003		-0.003		-0.003	
	(-1.27)		(-1.65)		(-0.62)	
agriculture land	0.271	***	0.271	***	0.271	***
	(3.82)		(3.33)		(3.53)	
population	-0.465	***	-0.465	***	-0.465	***
	(-3.98)		(-4.77)		(-4.73)	
travel time to border	-2.127		-2.127		-2.127	
	(-0.05)		(-0.05)		(-0.04)	
travel time to province capital	146.810	**	146.810	*	146.810	*
	(2.08)		(1.84)		(1.72)	
daily market	-302.097		-302.097	***	-302.097	***
	(-1.64)		(-2.93)		(-2.76)	
R-squared	0.4239		0.4239		0.4239	
No. of observations	387		387		387	
F-ratio	34.77	***	49.37	***		
Degree of freedom	378		378		378	

Note: * - significant at a ten percent level; ** - significant at a five percent level; *** - significant at a one percent level. T-values in parentheses.

Model 2 shows lower standard errors, which results from the use of clustered standard errors where each province is clustered individually in order to capture variation within the province. Model 3 using bootstrapping provides similar results. Bootstrapping provides a computationally intensive but essentially mechanical way of calculating standard errors or at least for checking that the standard errors given by the ordinary least squares regression is not misleading (Deaton 1997). The discussion below will focus on Model 2 and Model 3.

Following the independent variables in Table 6.8 we find that, with the assumption of clustered standard errors, the wholesale price variable registers a positive coefficient that is significantly different from zero at a five percent level for Model 2 and

a one percent level for Model 3. This means that the prices charged by the wholesaler located in the provincial center have an influence on the retail price. Not surprisingly, high whole prices provide higher retail prices.

With regard to the distance to the provincial center, the results show that the coefficients are of the right sign and statistically significant at a one percent level for Model 2 and a five percent level for Model 3. The results confirm that increasing distance from village to provincial center is an important determinant for higher retail prices in the village.

Male wage level as a proxy for income levels and opportunity to work outside the self-sufficient agriculture do not have a significant influence on the dependent variable in our estimation.

The size of the average holding of agricultural land in hectare as a proxy for the economic development of the village and the economic size of the market holds a positive sign and is strongly significant at the one percent level for both models. Access to large amount of agricultural land can be interpreted as higher economic standard and higher purchasing power, and thus a higher retail price for beer.

The size of the village population as a measure of market size does provide a negative sign with strong significance at the one percent level. The variable influences the price negatively where a large market can be interpreted as market with higher competition thus lower price levels.

The coefficients for travel time to border as a proxy for access to other brands of beer through import provides the expected negative sign, but the estimate is not significant in any of the models. Being located closer to a border, thus having access to imported beer, does not show any impact on the retail price.

Travel time to provincial center as a proxy for freight rates holds the correct sign with a significance at the ten percent level. It is not surprising that increasing travel time

provides higher retail prices, and it is the strongest positive determinant for the dependent variable in both Model 2 and 3.

Village access to a daily market has a strong negative influence on the dependent variable and is significant at the one percent level. The fact that the village market is an important facilitating institution for economic interaction and provides higher competition between retailers, thus giving consumers access to lower prices, is strongly supported in both Model 2 and Model 3.

6.6 Assessing the Determinants of Beer Retail Prices

This chapter has sought to improve our understanding of the determinants of the spatial price pattern of beer retail prices on village levels in Lao PDR. The spatial price patterns are analyzed by creating an analytical model for the distribution of beer with a selection of variable influencing the price level are divided into two parts; firstly by using available quantitative information by analyzing the descriptive statistics, and secondly by estimating the determinants of beer retail prices using a ordinary least squares regression framework. This concluding section summarizes key implications, and limitations of the analysis.

The results from the first part indicate that type of village and road access influence the retail price where urban villages and rural villages with access to roads exhibit lowest prices.

Turning to the geographical location, lowest average prices (Kip 5348 per bottle) and the lowest standard error was not surprisingly found in urban villages in Vientiane. Urban villages in the North record higher prices than urban villages in the South, which presumably reflects differences in transportation distance from Vientiane. Road access also has a strong impact on both the mean and the standard deviation of prices. Rural villages with access to roads (in particular, those with wet season road access) have lower average prices than rural villages without road access. In rural villages without road access, the entry barriers are higher, which presumably gives more market power to

traders and contributes to larger price band, depending on demand and other market conditions. Comparing rural villages without road access, it can be seen that the highest average prices as well as the highest standard deviations are recorded in the Central and Southern parts of the country.

Further, market size have an impact on the price levels in villages. The expected pattern, with a lower price in large villages, holds for urban and rural villages with road access, but not for rural villages without road access; a very interesting finding that could be explained by entry barriers for traders acting in villages without road access are quite high. The fact that larger villages without road access record higher prices indicates that they do not attract more sellers: instead, it is likely that the incumbent seller just meets more demand which allows him or her to raise prices.

Drawing upon the descriptive analysis presented in this chapter, it is possible to identify five principal elements of the market integration based on the analysis of retail prices for beer. These include (1) type of village are an important determinants of price levels, (2) access to road, (3) size of the market, (4) and access to a daily market. The results from the regression models suggest similar results where transport has a positive impact on the retail price providing higher prices on beer while variables related to market characteristics such as market size and access to a daily market have a negative influence on the retail price. Moreover, the amount of agricultural land in the village was used as a proxy for economic size of the local economy shows a positive effect on the retail price and can be interpreted as traders in a wealthy village sets the prices to reflect what their customers are willing to pay. The result could be interpreted as customers in a wealthy village tend to be willing to pay higher prices.

The LECS 3 provides a wealth of information on village characteristics, economic activities and surrounding environment and institutions, and offers unique opportunities to explore the patterns of market integration. However, the available data also have some limitations. A first caveat is that any estimation results should be interpreted with some caution, and seen as indicators of broad patterns and trends, rather than exact measures of

specific relationships between variables. A second concern is related to the continuous changes in the economic environment at all levels, local as well as regional and international. Such environmental changes may lead to rapid fluctuations in economic conditions and changes in behavior. Regular collection and analysis of primary data is therefore crucial to understand the underlying processes of change and development: in the case of Lao PDR, a particular problem in this area is the lack of timely and reliable regional and provincial data.

6.7 Discussion

To start the discussion it is useful to recall the research question which was formulated in the beginning of the disseration. *What factors influence the spatial price patterns of a homogenous retail product in Lao PDR and how do these patterns influence the degree of market integration?*

The free flow of products between markets is of great importance for the functioning of any economy. An integration of markets, supported by improvements in market infrastructure and transportation systems, can reduce transaction costs and allow trade between locations, with gains from comparative advantages and specialization. The descriptive analysis of beer prices indicates that transport costs in Lao PDR are not only determined by distance. Road access and the presence of markets are important determinants of prices at the village level. The high average prices and large price variations between villages without access to a road are likely to reflect a high variation in transportation costs and competition. The prices are high not only because it is expensive to transport Beer Lao to villages lacking road access, but also because there is not likely to be much competition between retailers on village markets.

The analysis of the spatial price patterns of Beer Lao studied how transport infrastructure and the development of local market institutions affect domestic market integration, as proxied by the price of a bottle of Beer Lao. The assumption underlying the chapter is that locations with lower prices are better integrated with the domestic

market: high prices can only be upheld in locations that are isolated from the domestic market because of high transport costs or because of the presence of local monopolies.

Looking at the spatial variation of prices across the country, the results indicate that urban areas and villages with road access record the lowest prices, presumably because transport costs were relatively low. Villages with markets also have lower prices than villages without markets, because of competition between sellers and traders. Moreover, larger villages record lower prices, which is probably also a result of heavier competition among traders: large villages can support a larger number of sellers than small villages. Villages without road access generally have higher price levels, both because the direct transport costs are higher, and because traders have higher market power than in locations with road access.

Given the high entry barriers (in terms of transport costs) the markets are too small to support several traders, and the incumbents can therefore charge high profit margins. This suggests that the benefits of improvements in transport infrastructre can be very substantial, extending far beyond the cost savings related to transport costs. By making the local markets constestable, transport investments can contribute to a reduction in the cost of imported products. At the same time, it is important to note that the increased efficiency related to the inflow of goods to villages benefitting from improved transport infrastructure reflects only part of the overall increase in welfare. It is likely that the prices of the goods produced by local households may increase, since less is lost in transport costs and profit margins charged by traders with market power.

A conclusion from these findings is that improvements in transport infrastructure can be expected to yield substantial benefits, both directly, through a reduction in the cost of transportation, and indirectly, through the effects on competition: villages with road access are contestable markets, in the sense that high prices will attract new sellers that put downward pressure on prices. Both of these effects will benefit local communities. Apart from giving them access to goods at lower prices, market integration will also improve their chances of selling their own produce at more favorable prices.

7. Integration and Internationalization in Lao PDR

7.1 Introduction

Earlier chapters focus on the market integration process solely from a domestic perspective. However, market integration does not only occur in isolation of international influence. In the case of Lao PDR the larger neighboring economies China, Thailand and Vietnam can be of special importance. The studied domestic market integration provides insights about how the transport infrastructure system in Lao PDR can result in different patterns of influence from the neighboring economies. For example, the northern parts of Lao PDR might show stronger linkages to China's economic development than the southern parts of the country. Results from a study analyzing the determinants of poverty using LECS 3 (Andersson *et al.* 2005) indicate that households located in the provinces adjacent to China record significantly higher consumption than households located in provinces bordering Vietnam and Cambodia. The reasons for the positive effects in the former case can be related to the increasing border trade, which has been stimulated by improvements in transport infrastructure and regional integration agreements between national governments facilitating economic integration. Even though the previous chapter could not detect any clear relationship between the retail price of beer and geographical distance to the closest border (presumably because beer imports were prohibited), there might be regional differences in the Lao and Chinese relationship which have an impact in the Lao domestic market integration. The purpose of the present chapter is study the Chinese influence on Lao PDR using trade and FDI data.

Since the introduction of the reform program known as the New Economic Mechanism (NEM) in November 1986, Lao PDR has been in a slow transition from a centrally planned economy towards a market economy. Openness and outward orientation have been stressed as central policy objectives, and simplification and liberalization of trade and exchange rate regulations have contributed to a more transparent environment for both export and import activities but also domestic trade. These unilateral reforms were strengthened by the country's accession to ASEAN's Free

Trade Agreement (AFTA) in 1997, which has gradually improved access to the regional export market at the same time as it has reduced the import tariffs towards other AFTA members. The negotiations for WTO membership, which commenced in 1997, have also helped clarify the country's trade policy ambitions. Like many other countries, Lao PDR sees globalization – in the form of international trade and foreign direct investment inflows – as a vehicle for economic growth and development.

So far, the results of the market oriented reforms have been encouraging, although Lao PDR remains one of the poorest countries in East Asia. Development has accelerated since the late 1980s, and the average annual GDP growth rate for the past two decades exceeds six percent. Over the same period, the poverty rate has fallen from nearly 50 percent to less than 30 percent.

One of the characteristics distinguishing Lao PDR from most other developing countries is its geographical location next to China as shown on Figure 7.1. Being a neighbor to China highlights both the opportunities and challenges of globalization: the huge Chinese market is within reach of many Lao producers and could potentially swallow any amount of exports from Lao PDR, at the same time as the threat from Chinese exports is ubiquitous.

Figure 7.1 Map of Greater Mekong Subregion

Source: Author´s map

Another distinguishing mark of the Lao economy is the strong fragmentation of the national market. The low population density (only 24 people per square kilometer) together with mountainous geography and severely underdeveloped transport infrastructure mean that domestic market integration is weak. Hence, while the northern part of Lao PDR is located close to China, the southern part is not, in an economic sense. It is more expensive to transport goods from southern Lao PDR to China, by road or via Thai or Vietnamese ports, than to ship goods to China from major ports in South Asia or even Africa. As identified, trade with China has contributed significantly to the economic development of Lao PDR, but the Chinese footprint has looked different in different parts of the country.

The particular features of the Lao market mean that the experiences of Lao PDR can be used to illustrate two kinds of trade relations with China. The northern part of the country has had ample opportunities to engage in border trade in a wide variety of products, thanks to relatively low entry barriers in terms of transport and transactions costs. Southern Lao PDR, by contrast, has faced higher costs in its trade with China, which has limited the range of products that can be exported and imported. If the first of these cases is described as “integration”, the second one illustrates “internationalization”.

The purpose of this chapter is to describe the development of international trade and foreign direct investment (FDI) in Lao PDR, with focus on the relations with China. Section 7.2 provides an overview of the structure of trade and FDI in Lao PDR. Section 7.3 looks more specifically at the relations with China, highlights the differences between northern and southern Lao PDR, and discusses the effects on poverty reduction and income distribution. This discussion focuses on the period 1997/98-2002/03, for which detailed data are available from comprehensive living standard surveys: it is likely that the differences between the northern and southern parts of the country will diminish over time, as the as the north catches up to the the rest of the country. The different influence from China highlights the fragmented domestic markets studied in previous chapters. Section 7.4 concludes.

7.2 Trade Policy, International Trade, and FDI in Lao PDR

During the first decade after the introduction of the NEM, Lao trade policy remained fairly restrictive and non-transparent in spite of some unilateral attempts at market oriented reform. The tariff structure was complicated and import duties on many products were high, various exemptions and reductions were frequently applied, and a large number of non-tariff measures (such as foreign exchange controls and import licensing requirements) were in place, as well as various taxes and fees on exports (World Bank 2006; UNDP 2006). A more comprehensive reform process started in the mid-1990s, when a number of regional and multilateral initiatives were added to the cautious unilateral reforms. The most important of these initiatives was the accession of Lao PDR to the Association of Southeast Asian Nations (ASEAN) and its Free Trade Area (AFTA) in 1997. The objective of AFTA is to eliminate all tariff and non-tariff barriers in the trade between member countries, and to promote economic efficiency and competitiveness through increased competition, specialization, and opportunities to exploit scale economies. By 2005, the five original ASEAN nations – Thailand, Indonesia, Malaysia, Singapore and the Philippines – had in principle reduced their tariffs on intra-regional trade below five percent. Lao PDR reached the same target in 2008. Apart from the goods in the *Inclusion List* that are subject to tariff reductions, each member country also has the right to place a small number of products in a *Highly Sensitive List* and a *General Exception List*. The tariffs on these products – e.g. rice, which is typically considered a sensitive commodity – are allowed to remain higher. (See http://www.aseansec.org/12021.htm.)

ASEAN has also been an important vehicle for simplifying trade with China. For instance, the *Early Harvest Program* of the trade agreement between ASEAN and China has reduced Chinese import tariffs on many agricultural commodities in advance of the free trade agreement, which is expected to come into force in 2010 for the more developed ASEAN countries and in 2015 for Lao PDR.

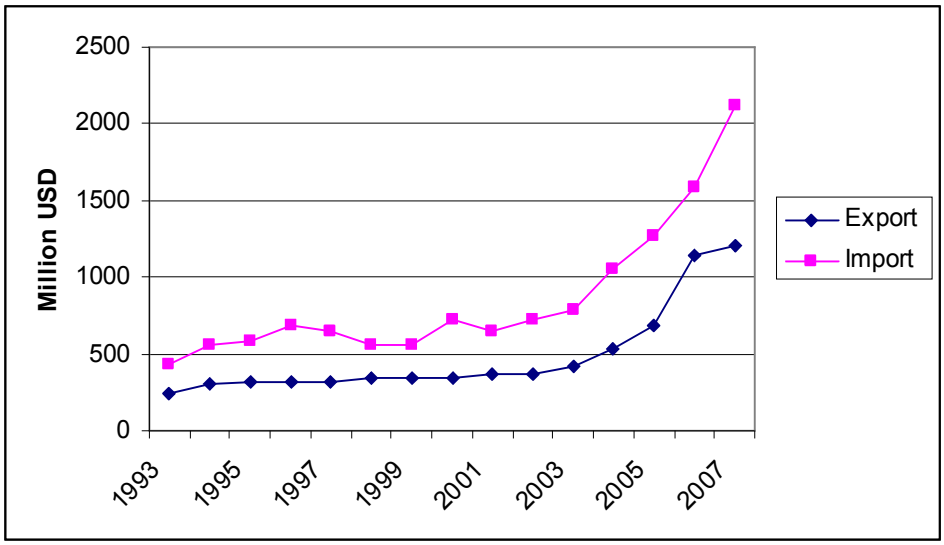
Other important agreements guarantee market access in the main OECD markets. Lao PDR has been included among EU's GSP (Generalized System of Preferences) partners since the early 1990s, and tariffs on Lao exports have therefore been well below MFN (most Favored Nation) tariffs. These preferences were particularly important for the early development of the Lao garment industry (UNDP 2006). Since 2002, Lao exporters have benefited from the *Everything But Arms* program, which provides duty-free access to the Single Market for almost all exports from Least Developed Countries. Access to the Japanese market is also facilitated by GSP preferences, although these preferences are lower than in the EU market, and rules of origin appear to be a more substantial problem (World Bank 2006). Trade with the US is governed by a BTA (Bilateral Trade Agreement) from 2004 that grants Lao PDR normal trade relations, meaning access to US market on MFN terms. Unlike the GSP programs of the EU and Japan, this bilateral agreement does not provide any preferences beyond MFN, and requires Lao PDR to undertake a number of reforms in the trade area. These reforms are intended to simplify trade regulations and improve access to the Lao market for US and other foreign investors. The requirements in the US agreement are broadly consistent with WTO regulations, and the BTA can therefore be seen as an important step towards WTO membership. Lao PDR applied for WTO membership in 1997, but the negotiations did not commence until 2004 and are only progressing slowly.

As a result of these bilateral and multilateral agreements, the trade policy environment has become significantly less restrictive during the past decade. World Bank (2006) notes that "MFN import duties in Lao PDR are low and not highly dispersed", with only six rates in the tariff schedule (in the range 5-40 percent) and an unweighted average tariff of around 10 percent. Official policy also supports exports. In addition to efforts aiming to encourage locally owned firms to produce for the regional and global market, the government has provided favorable conditions for export oriented foreign investors in areas like textiles and garments, hydropower, mining, wood products, and commercial agriculture. This notwithstanding, non-tariff barriers remain a concern, with cumbersome procedures both on the import and export side, as well as problems with

implementation of regulations and coverage of trade statistics. A large share of trade – in particular border trade – is informal and therefore not registered in official statistics. For obvious reasons, it is difficult to assess exactly what share of overall trade is unregistered, but it can be noted that UNDP reports that at least 20-30 percent of overall trade goes unregistered, with substantially higher shares for agricultural exports in border regions (UNDP 2006).

The trade reforms, together with price liberalization and other domestic reforms, have supported growth and development and also led to a substantial increase in trade volumes over the past decade. Figure 7.2 illustrates the development of Lao exports and imports since the early 1990, and highlights two points. Firstly, the increase in trade volumes, particularly during the past few years, is notable even taking into account the fact that much trade remains unregistered. The nominal values of exports and imports have more than doubled in the past five years and tripled in the past ten years. This has raised the ratio of trade to GDP from well below 20 percent in the early 1990s to around 30 percent in 2006-07. Yet, trade volumes remain low, reflecting low productivity and income levels. To put the aggregate amounts in perspective, it can be noted that Lao exports per capita reached USD 130 in 2005, which can be compared to some USD 550 USD per capita in China or nearly USD 400 per capita in Vietnam.

Figure 7.2 Lao Exports and Imports 1993-2007 (million USD)



Source: IMF Country Reports (various issues).

Secondly, Figure 7.2 illustrates Lao PDR's persistent trade deficits. Goods imports have consistently been larger than exports, and revenues from services like tourism and overflight rights have not been sufficient to finance the deficits in goods trade. The deficits have instead been financed by steady inflows of official development assistance and remittances from Lao citizens working abroad, in particular in Thailand. In an historical perspective, it is interesting to note that it is hard to find any year since the late 19th century with a Lao trade surplus. During the colonial period, there was a net inflow of resources to the country from France and other parts of Indochina, various political groups in Lao PDR were supported by the parties in the Indochinese Wars between the 1940s and the 1970s, substantial support from Vietnam continued for more than a decade after the communist takeover in 1975, and the international aid community has provided billions of USD to promote the country's development during the past decades. Since the early 1990s, official development assistance has fluctuated between 10 and 20 percent of GDP, which makes Lao PDR one of the most aid dependent countries in Asia.

7.2.1 Trade Partners and Trade Structure

Although Lao PDR has been politically dependent on Vietnam since 1975, when the current regime came to power with support from Vietnam, there is no doubt that the most important economic relationships are with Thailand. These relationships have not only been facilitated by similarities in culture and language (Lao and Thai are closely related), but also by geography. A large share of the Lao population is found along the Mekong river, which forms the border to Thailand, whereas the areas bordering to Vietnam, China, and Cambodia have been more sparsely populated (although all border provinces record faster population growth than the inland provinces). The first bridge over the Mekong river was not opened until 1994, but the river itself and its tributaries form an important transport network that links large parts of Lao PDR to Thailand. The transport infrastructure in other border regions is weaker, although regional infrastructure projects like the East-West Corridor that links northeastern Thailand to Danang in central Vietnam (via central Lao PDR) and the North-South Corridor connecting northern Thailand to China's Yunnan province (via Luangnamtha and Bokeo provinces in Lao PDR), have improved the situation. Yet, for most Lao producers, it is less costly to trade with Thailand than with the other neighboring countries (Edmonds & Fujimura 2008). Hence, Thailand has accounted for most of Lao exports and imports. EU and Vietnam are other important export destinations, but China has been relatively insignificant, at least according to officially registered statistics. On the import side, China and Vietnam are the second and third largest trade partners, but remain far behind Thailand.

Given the low level of development of Lao PDR, it is not surprising that the structure of exports is heavily biased toward primary products. With nearly half of the country's land area under forest cover, timber and wood products have traditionally been the most important export goods. In recent years, official timber exports have been reduced because of environmental concerns, but wood products from forest plantations remain important. Although the great majority of the country's population is engaged in farming, the agricultural sector has not been very important in officially registered

exports. The main exception is coffee, which was introduced to central and southern Lao PDR by the French already in the early 20th century. Exports became important in the 1980s, when coffee was used to repay debts to the Soviet Union and Vietnam. These exports were mainly made up of unroasted beans of low quality, and sales stagnated when trade with the communist block fell away towards the end of the decade. A recovery has taken place since the mid-1990s, and larger integrated firms (with plantations as well as capacity for roasting, milling, and packaging) have begun to replace the small coffee farmers that dominated in the past (Andersson *et al.* 2007). Although other cash crops – e.g. sugar cane, maize, and rubber – have been introduced in recent years through foreign direct investment projects based on large land concessions, agriculture remains a small part of formal exports. However, it should be noted that farm products and non-timber forest products are important parts of the informal border trade between Lao PDR and its neighbors.

The mountainous geography and the Mekong river with its many tributaries also provide Lao PDR very notable hydroelectric potential. Electricity exports have been important since the late 1990s and several ongoing hydropower projects will increase the sector's export capacity in the future. Similarly, mining has become an important export sector in recent years. Lao PDR has substantial reserves of gold, copper, tin, zinc, gypsum, sapphires, and other minerals, and although only a few major mines are in operation at present, there is a large number of mining concessions in the early stages of exploration and investment (Shingu 2006).

Aside from wood products, textiles, garments, and footwear make up the most important manufacturing exports. The main importer of textiles and garments is the EU: as noted earlier, the origins of the industry lie in EU trade preferences and export quotas under the MFA (Multi-Fiber Agreement). The expiration of the MFA at the end of 2004 has put pressure on many of the producers in Lao PDR (primarily foreign investors) who are less competitive than the leading Chinese producers. The introduction of new quotas

for Chinese producers in the EU has given some temporary relief to weaker developing country exporters, but the medium term prospects for Lao PDR are not very positive.

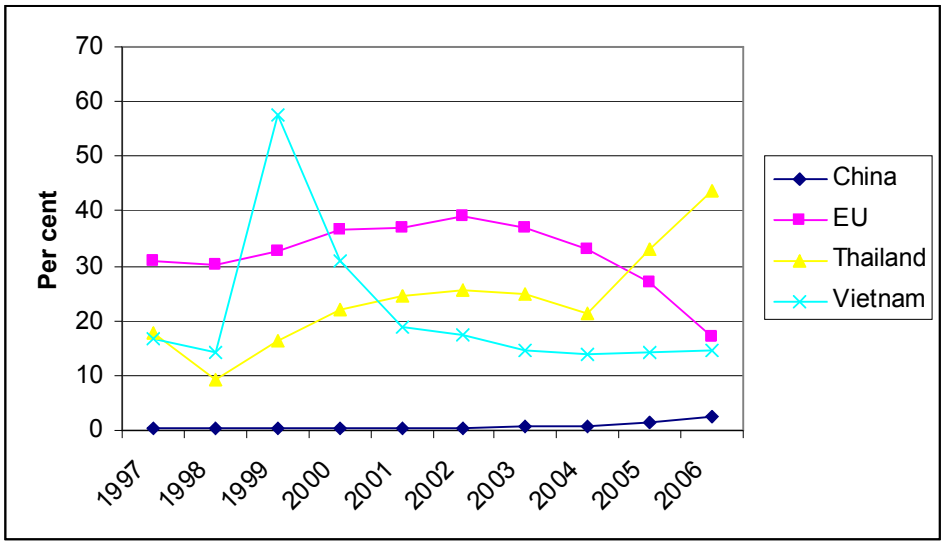
The main export sectors are also the main sectors of interest for inward FDI, which is not surprising considering the small size and purchasing power of the country's domestic market. The first substantial foreign investments were made in the garment and wood products industries in the early 1990s, telecommunications and hydropower took over some years later, and mining emerged as a major investment sector around the turn of the millennium. In the past few years, agriculture has also appeared among the sectors with substantial FDI: several large land concessions have been granted to foreign investors for forest plantations, rubber, maize, sugarcane, rice, and other commodities.

The official trade statistics collected by Lao authorities do not provide any accurate description of the structure of imports and exports. The main reasons are the weak capacity of the statistical authorities in Lao PDR and the high share of informal trade, which is partly facilitated (or caused) by an inefficient customs administration. The fact that much trade if informal makes it difficult to double-check the Lao export records by examining import data from the country's trade partners: the lack of formal export and import records spills over to the trade statistics of the neighboring countries. Hence, there are substantial discrepancies between the export data recorded by the Lao Ministry of Trade (see e.g. IMF 2000) and the import data registered by the trade partners of Lao PDR. These discrepancies do not follow any systematic pattern – some years, partner data show much lower trade volumes than official Lao records, other years the opposite is true.

In particular, it is difficult to describe the country structure of Lao trade. As noted earlier, Lao PDR is a landlocked country and virtually all traded goods have to pass through one of the neighboring countries. In most cases, the transit country is Thailand, but some exports are also routed via ports in central Vietnam (mainly Danang). Even if export and import volumes are accurately registered at the border, there is a risk that the final destinations or origins of the goods are lost, and the transactions are recorded as

trade with Thailand or Vietnam. For example, Lao statistics suggest that about 65 percent of exports in 1997 were destined to Thailand and Vietnam, whereas Thai and Vietnamese import statistics imply that their combined share of Lao exports was below 35 percent: the difference is probably re-exports to overseas locations. Although it is difficult to determine the exact shares of specific countries, it is possible to use this type of data to illustrate changes over time. This is done in Figure 7.3, which uses partner import statistics to show how the shares of four important export destinations – Thailand, Vietnam, China, and the European Union (EU) – have changed over time. The most notable point in Figure 7.3 is the very low share of China, which did not reach 1 percent of Lao exports until 2005. Another interesting observation is the reduction in the share of the EU and the increase in the share of Thailand during the past decade.

Figure 7.3 Country Distribution of Lao Exports 1997-2006 (percent)



Source: IMF Country Reports (various issues) for total exports, UN Comtrade for imports by trade partners.

The commodity composition of Lao trade is easier to observe at border stations, and it is likely that these data are more useful than those on the direction of trade. In

particular, it is easier to discern which commodity groups are underrepresented in official statistics. A major share of informal trade is likely to involve agricultural products and timber on the export side, and consumer goods on the import side: trade in minerals, electricity, fuel and capital goods is probably captured reasonably well, because it is undertaken by larger firms that are more visible to the authorities. Table 7.1 summarizes the commodity composition of exports and imports during the period 1998-2006. The changes on the export side are significant. Electricity, timber, and garments were the main export products throughout the 1990s, and they remain important. Electricity is expected to keep its position as new hydropower projects come on line in the future. The mining industry has developed quickly since 2003, with gold and copper now accounting for nearly half of Lao exports. Official exports of timber have fallen because of stricter logging restrictions, but it is likely that substantial informal exports still occur. Four commodities – gold, copper, timber, and coffee – account for almost three-quarters of official exports.

The main development on the import side is a strong increase in the share of investment goods. The relatively favorable economic conditions during the past half-decade (including the high world market prices for raw materials and energy) have stimulated investment, not least in the mining sector, and boosted the imports of capital goods. Consequently, over two-thirds of official imports can be classified as investment goods or intermediates. The low share of consumer good imports is partly explained by the low incomes (and demand) of the population and partly by high informal imports of consumer goods from Thailand and China.

Table 7.1 Commodity Composition of Trade, Lao PDR, 2000-2006 (percent)

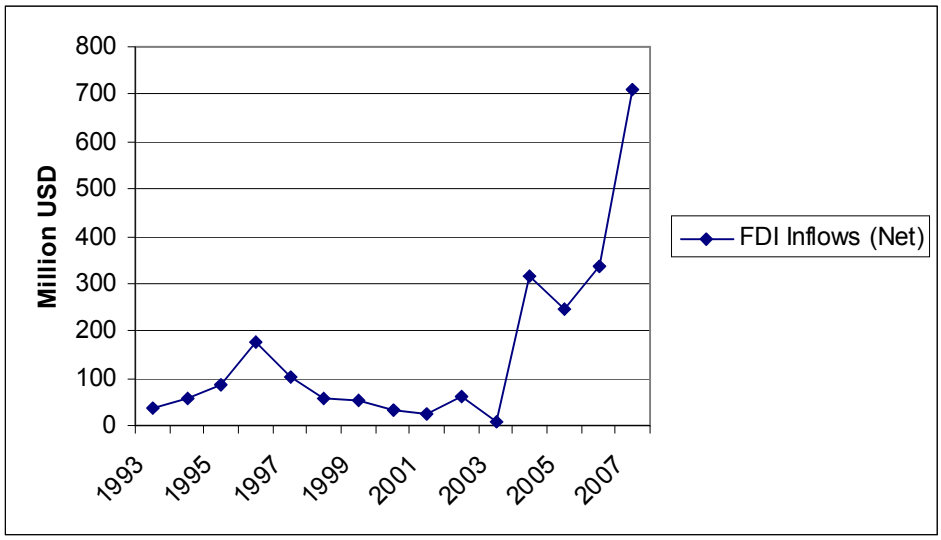
Major commodity	1998	1999	2000	2001	2002	2003	2004	2005	2006
Exports (% or total recorded exports)									
Gold	0	0	0	0	0	13	12	14	10
Copper	0	0	0	0	0	0	0	17	36
Electricity	20	25	33	29	28	19	18	17	11
Timber	34	29	20	29	31	28	29	21	17
Garments	21	20	31	31	31	29	31	21	11
Coffee	14	4	4	4	5	2	3	3	1
Other	11	22	12	6	6	8	7	6	13
Imports (% of total recorded imports)									
Petroleum	22	13	22	13	16	13	11	13	13
Capital goods	37	33	33	35	31	39	48	51	41
Garment materials	12	12	9	13	13	12	12	9	6
Electricity	1	2	1	1	1	1	2	2	2
Other	28	40	35	38	40	34	27	25	36

Source: IMF Country Reports (various issues).

7.2.2 Foreign Direct Investment Inflows

A large part of the investment boom in Lao PDR is related to foreign direct investment. As shown in Figure 7.4, the annual net inflows of FDI have increased very substantially in recent years, from around USD 50 million in the aftermath of the Asian crisis to about USD 300 million in 2004-2006, and over 700 million in 2007. It should be noted that these are figures for realized net FDI, as reported in the country's balance-of-payments: the value of foreign direct investment licenses approved during the period 1995-2006 was about four times higher. Although the gap between licensed investment and realized investment is large, it is not remarkable compared to other developing countries opening up to foreign direct investment (see e.g. Kokko & Zejan 1996). The risk levels in FDI projects are high, and license applications are typically based on best-case scenarios that are rarely realized in the short run.

Figure 7.4 Net Inflows of FDI 1993-2007 (million USD)



Source: IMF Country Reports (various issues).

There are no readily available data on the source country and industry distribution of realized FDI, but Table 7.2 summarizes some data on the distribution of investment licenses for the periods 1996-2000 and 2002-2007. The main FDI license holders during the ten-year period covered by the data were Thailand and the other ASEAN countries (mainly Vietnam), Australia, and the EU, but the most remarkable development is the increase in the Chinese share towards the end of the period. It is likely that China is now the largest foreign investor in Lao PDR, even though the data on license approvals may underestimate the role of EU and Thai investors, who have often recorded a smaller gap between license approvals and actual investment amounts than investors from other countries. Chinese FDI in Lao PDR is mainly focused on commodities, and forms part of the Chinese drive to secure access to raw materials like minerals, agricultural raw materials, rubber, and other forest products. Once these investments come on line, they will result in an increase also in the share of Lao exports that are directed to China.

Table 7.2 Country and Industry Distribution of Approved FDI (percent)

	1996-2000	2002-2007
Country distribution of approved FDI	*%*	*%*
Thailand	50	22
China	2	19
Vietnam	n.a.	9
France	0	7
Japan	1	7
India	n.a.	6
Australia	1	5
Korea	18	5
Malaysia	18	2
Singapore	1	2
Others	10	17
Industry distribution of approved FDI		
Agriculture	4	12
Mining	1	10
Electricity	15	53
Construction	n.a.	3
Manufacturing	23	7
Hotel and restaurant	14	3
Other, including telecommunications	43	12

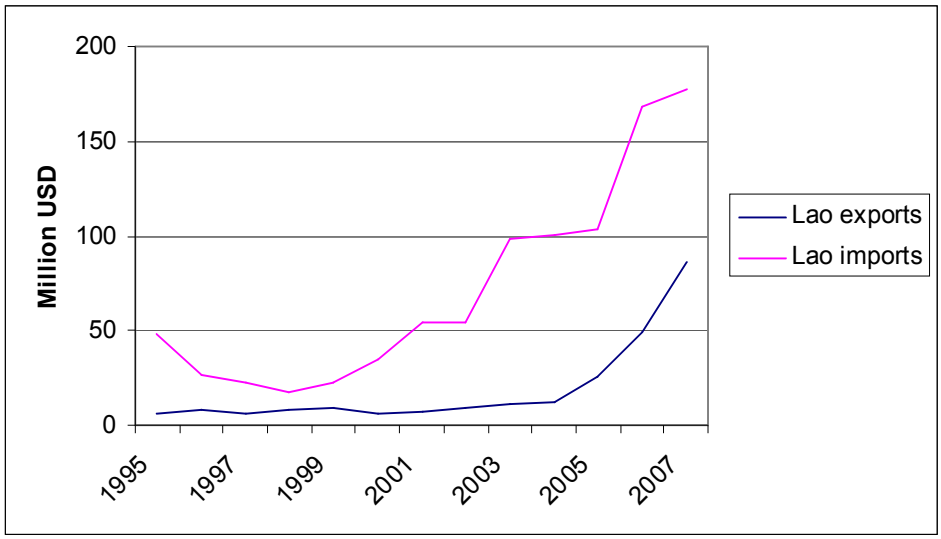
Source: IMF Country Reports (various issues).

Looking more broadly at the industry distribution of FDI licenses, there is a clear shift between the 1990s and the last few years. During the 1990s, most foreign investors focused on garments, telecommunications, and electricity generation. The first two of these industries have lost shares over time, since the competitiveness of the garment industry has suffered from the expiration of the MFA and the telecommunications network has been put in place. At the same time, mining, electricity generation and agriculture have become more important. Taken together, these three industries accounted for 75 percent of the approved inward FDI 2002-2007. There are no records of outward FDI from Lao PDR, which is consistent with the weak development of Lao industry.

7.3 Trade and FDI Relations between Lao PDR and China

The officially recorded bilateral trade between Lao PDR and China is relatively small. China accounted for less than 1 percent of Lao exports before 2005, but its share has been rising fast since then: in 2007, the Chinese share exceeded 5 percent for the first time since the start of economic reforms. The Chinese share of official imports has been higher during most of this period, and exceeded 10 percent in 2006. Consequently, Lao PDR has recorded a notable deficit in its trade relations with China. As Figure 7.5 shows, the deficit started growing rapidly in the late 1990s, and has averaged nearly USD 100 million per year since 2003.

Figure 7.5 Lao Exports to and Imports from China (million USD)



Source: Comtrade (based on data on Chinese exports and imports).

However, official data underestimate the importance of China. It is easy to observe that both Chinese consumer goods and capital goods are much more abundant in the Lao market than what official statistics suggest – unregistered imports are common – and there are also substantial informal exports to China, particularly from the northern provinces of the country.

The penetration of Chinese products is not surprising. China is not only a neighboring country, but also the world's leading exporter of low-cost manufacturing goods, and should therefore be expected to hold a large share of the Lao market. This has positive as well as negative effects on the Lao economy. The abundant supply of cheap Chinese goods has undoubtedly raised the welfare of Lao consumers throughout the country. In particular, it is interesting to observe how cheap Chinese generators, satellite disks, and television sets can now be found in many remote villages that lack permanent road connections to the outside world. At the same time, it is necessary to recognize that the proximity to China puts domestic manufacturing industry in a difficult position. With a small domestic market and a very limited supply of skilled workers, Lao manufacturing industries will find it very hard to match their Chinese competitors unless they can rely on some sort of institutional advantage (e.g. strong import protection or preferential access to third-country markets). In its trade with China, Lao PDR is therefore an importer of manufactured goods and an exporter of commodities. Manufactured goods (mainly machinery and equipment) account for over 90 percent of registered imports from China, while a similar share of exports to China is raw materials – mainly agricultural products, timber, rubber, and recently also minerals.

7.3.1 Northern versus Southern Lao PDR

An important feature of trade with China is that its importance and character varies between the regions of the country. In the central and southern parts of Lao PDR, Chinese goods meet tough competition from products from Thailand and Vietnam. In particular, Thai and Vietnamese producers have been able to capture large shares of light consumer goods, while the Chinese appear to be more competitive in durable consumer goods and capital goods. In the northern part of the country, imports from China have higher market shares across the board. Although not shown clearly in official statistics, this includes substantial (informal) imports of food and beverages and various light consumer goods.

Similarly, the importance of China for exports differs between the south and the north. In southern and central Lao PDR, small scale production and informal trade relations have for a long time been directed towards Thailand and Vietnam. For instance, much of the surplus from small scale farming along the Mekong river (live animals, rice, fruits and vegetables) is eventually exported to Thailand. While these household-based activities are still important for the aggregate economy, they have gradually been overshadowed by more explicitly export oriented production. This includes large scale plantation agriculture – rubber, timber, coffee, sugarcane, and other crops – as well as mining and electricity generation. The products from small farms in southern Lao PDR are rarely (if ever) exported to China, unlike industrial commodities like timber, rubber, and minerals.

The differences between these categories of exports are largely explained by transaction costs and scale of production. The weak market infrastructure – in particular, the underdeveloped transport network – means that the transaction costs for exporting from southern or central Lao PDR to China are very much higher than the costs for exporting to the neighboring countries. Moreover, these costs are more or less fixed: the necessary expenses for shipping commodities to China are largely independent of transaction volume (up to some limit), since there are few standardized transport services available for small-scale transactions. To be able to cover the higher costs for trade with China, it is therefore necessary to operate at a relatively large scale. Large scale plantations and mines – or sectors with efficient intermediaries or middlemen that can collect goods from many small producers – will be able to sell to distant customer, small farmers will not.

In northern Lao PDR, by contrast, transaction costs are lower and it is possible also for small farmers to participate in trade with China. The lower costs are partly due to the shorter distance to China, but also related to the presence of Chinese contractors and investors operating on the Lao side of the border (which in turn is explained by geographic proximity). By encouraging local farmers to produce commodities demanded

in China and collecting produce at the farm gate or at local markets – sometimes also providing credits and seeds, fertilizers, and other inputs – these intermediaries are able to reduce both transaction costs and perceived risk for individual farmers. There is also some border trade with Thailand, but weaker relations with Vietnam because of poor transport infrastructure and low population density in the border areas. Because the general level of development in northern Lao PDR is lower than in the south, it is also notable that the north has until recently received few large scale investments in plantations, mines and hydropower in comparison with the south. During the past few years, this picture has slowly begun to change, as a result of significant Chinese investments in plantation agriculture: Chinese investors have been granted large land concessions for various crops, ranging from rice to rubber. There are also plans for investments in mining and hydroelectricity in the northern provinces, but the existing production capacity in these sectors is limited (with the exception of some small-scale mining for rubies and gold).

These differences between the north and the south make it interesting to look more closely at how the links with China affect development in the two parts of the country.

Most of northern Lao PDR is classified as mountainous and poorly suited to agricultural use. Deforestation is a serious problem because of the common practice of swidden agriculture and productivity has traditionally been low in comparison with the lowland areas along the Mekong river. Increased population and government land use regulations have limited the acreage available for swidden agriculture during the past decades, reducing fallow periods and contributing to accelerated soil erosion – this has further reduced productivity. As a result of its weaker agricultural potential, northern Lao PDR has traditionally been poorer than other parts of the country. Table 7.3 shows how the poverty incidence (i.e. the share of the population living below the poverty line) has changed in the different regions of the country between 1992/93 and 2002/03: the years noted in Table 7.3 are chosen because they mark comprehensive living standard and

expenditure surveys, which provide detailed information for the calculation of poverty rates. The northern provinces exhibit the highest poverty rates at all three points in time, whereas the southern provinces are in a somewhat stronger position. However, the rate of poverty reduction has been higher in the north, particularly since 1997/98.

Table 7.3 Poverty Incidence in Lao PDR 1992/93-2002/03, per region

Region	**1992/93**	**1997/98**	***2002/03***
Northern	51.6	47.3	*37.9*
Central	45.0	39.4	*35.4*
Southern	45.7	39.8	*32.6*
Vientiane municipality	33.6	13.5	*16.7*
Laos total	***46.0***	***39.1***	***33.5***

Source: Author's calculations based on LECS

Because of the higher poverty rates, northern Lao PDR has been a priority target for both the government and international donor agencies in their work to improve development conditions and reduce poverty in the country. Recent aid efforts have focused on introducing cash crops to replace opium and swidden cultivation in the highland communities, in order to establish more sustainable agricultural practices and assisting livelihood security. However, since the late 1990s, market forces have arguably had even stronger effects on the process of structural change. Improved road links to Yunnan province in China (and to a lesser extent to Thailand) have boosted demand for agriculture commodities and stimulated a shift away from subsistence agriculture, towards commercial farming, with positive effects on rural livelihoods.

Sugar and rubber have emerged as two of the most important cash crops in northern Lao PDR as a result of this process. Cultivation of sugar cane started in the mid-1990s with a small number of households planting sugarcane. However, initial problems with transporting the crop to markets due weak infrastructure led to financial losses for the farmers. Since the turn of the millennium, sugar is mainly produced on contract basis for Chinese intermediaries, but under supervision by districts offices. Usually sugar contracts allocate 30 percent of the net revenue to the Chinese investors and 70 percent to

the growers. The Chinese investors provide sugar seedlings, fencing wire, and fertilizer. The costs of input materials are deducted before net revenue is divided.

Rubber plantations follow a similar pattern, with Chinese intermediaries promoting contract farming by providing seedlings, fertilizers, and credits to villagers. The investment in planting rubber trees is a long-term undertaking, which requires at least 8 years until the first harvest. Since the boom in the northern Lao rubber sector only began around the turn of the millennium and accelerated from around 2005, it is still too early to determine how successful or profitable it will be. A particular concern is that rubber trees are sensitive to cold weather at the same time as wide areas in northern Lao tend to be exposed to frost with intervals of approximately 10 years.

The demand from China has also affected many other crops. The production of maize, watermelon, capsicum, and other fruits and vegetables has increased notably, as has the production of paddy rice. This has largely been possible because production of upland rice for subsistence has fallen, as lands used in shifting cultivation are increasingly used for market-oriented production. Stressing the novelty of commercial farming, Thongmanivong & Fujita (2006) note that crop selection has been remarkably variable since the late 1990s, as farmers have experimented with different varieties of cash crops and adjusted their production to fluctuating export prices. They also note that agricultural land itself has become a commodity. During the dry season, some Lao farmers rent their paddy fields to Chinese farmers, who grow watermelon and other vegetables during 5-6 months, and return to China with their produce after the harvest. The increasing number of land concessions reported during the past few years is also a clear sign of the fact that land is becoming an increasingly important asset.

In addition to the boom in commercial farming, there has also been an increase in the exploitation of non-timber forest products like bamboo, rattan, tree fruit, broom grass, and medicinal or fragrant plants. Apart from their use for subsistence needs, these products are important sources of income for the local population, especially in the uplands. Some of the most important commercial plant species are cardamom and palm

nuts. Several species of bamboo shoot are collected throughout the northern region, processed locally, and exported to both Thailand and China. Moreover, the increasing contacts with China, which have largely developed as a result of the Northern Economic Corridor, have also stimulated economic activity outside the agricultural sector. Tourism and transit trade have increased, bringing investments in various service industries, and light manufacturing industry has also expanded. Recent industrial developments include Chinese-owned motorcycle and cigarette lighter factories and battery production in Oudomxai (Andersson *et al.* 2007; Lyttleton *et al.* 2004).

Although these developments are clearly visible on the ground, they are difficult to document given the lack of systematic data on small scale production and informal trade in Lao PDR. Yet, there is evidence from case studies confirming that commercial agricultural in northern Lao PDR began to expand from the late 1990s. For instance, Thongmanivong & Fujita (2006) report a notable reduction in shifting agriculture and an increase in permanent agriculture in the four northern provinces Bokeo, Luangnamtha, Oudomxay, and Luang Prabang already during the second half of the 1990s, as well as rapid increases in cash crop production. Lyttleton *et al.* (2004) examine developments in some villages in Luangnamtha, and emphasize the importance of improved road infrastructure – in particular, the construction of a road link between China and Thailand, passing through the province – for economic development. Table 7.4 shows both how agricultural exports to China from the Muang Sing district in Luangnamtha, which was the main target of their study, were growing rapidly in 2001-2003, and how the relative importance of different crops varied between the two growing seasons.

Table 7.4 Value of Agricultural Exports, Muang Sing district, 2001/01-2002/03 (million KIP)

Export product	**Destination**	**2001/02**	***2002/03***
Rice	China	3870	*3000*
Maize	China	3750	*13000*
Garlic	China	240	*150*
Sugar cane	China	1120	*2844*
Livestock	Thailand	176	*173*
Firewood	China	16	--
Watermelon	China	1280	--
Cardamom	China	105	--
Bark	China	112	--
Grass	Thailand	450	--
Capsicum	China	--	*600*
Total		***11119***	***19767***

Source: Lyttleton et al (2004).

More recent information on export licenses from the northern provinces Luangnamtha and Oudomxay in 2006-2007 (see Table 7.5) also highlight the fact that China is the main export destination and that agricultural commodities account for a high share of exports. An important caveat is that these figures refer to export licenses rather than actual trade. Unfortunately, it is not possible to compare these figures with actual trade volumes, since official data are incomplete: for instance, UNDP (2006) reports that almost none of the agricultural exports from the northern provinces in 2005-2006 were registered in official statistics.

Table 7.5 Export Licenses from Luangnamtha and Oudomxay in 2006/07 (9 months)

Luangnamtha	**USD**	**Oudomxay**	**USD**
Exports to China	***4,550,593***	***Exports to China***	***4,747,629***
Wood and processed wood	99,618	Agricultural products	3,453,986
Forest products	72,942	Wood products	171,918
Agricultural products	2,474,525	Processed wood	1,071,070
Buffalos	26,250	Other	50,655
Gold	513,855		
Rubies	1,363,403		
Exports to Vietnam	***2,745***	***Exports to Vietnam***	***837,845***
Agricultural products	2,745	Wheat flour	764,981
		Flowers	53,618
		Soy beans	19,247
Exports to Thailand	***1,660,328***	***Exports to Thailand***	***--***
Wood and processed wood	21,569		
Forest products	219,181		
Agricultural products	10,045		
Rubies	1,409,533		
Total	***6,213,666***	***Total***	***5,585,474***

Source: Data provided by Department of Export and Import, Ministry of Commerce and Industry Lao PDR.

The structure of trade in southern Lao PDR differs in several ways from that in the north. One notable point is that the south has not experienced any boom in agricultural exports comparable to that in the north. Farmers in southern Lao PDR do export various commodities to Thailand and Vietnam, but their exports have developed gradually and have not been strongly affected by recent infrastructure projects that have opened up new markets in the neighboring countries. Moreover, the commodities from small farms in Lao PDR are not very competitive in comparison with products from Vietnam and Thailand, with a few exceptions. The outlier is the Lao coffee industry, which has managed to capture a position in the global market. Another difference is that large firms have a more dominant position in the southern part of the country. An increasing share of agricultural exports comes from large plantations rather than small farms – this is true even for the coffee sector, which used to be based on small-scale production. The mining and hydropower industries, which hold a large share of total exports from southern Lao PDR, are of course also based on large enterprises. The Sepon

mining complex, which is the largest site for copper and gold mining in Lao PDR, is located in Savannakhet in the southern part of the country, and several other mines for limestone, tin, and gypsum are found in the neighboring provinces. Including projects under construction, the country's hydropower capacity is evenly divided between the southern and central parts of the country – so far, the northern provinces only have marginal investments.

The development in the coffee sector can be used to illustrate the changing character of export agriculture in southern Lao PDR. Coffee was first introduced to Lao PDR by the colonial French in the early 1900s. Production is concentrated in and around the Bolaven Plateau in the south, which has the most suitable conditions for growing coffee. The industry was weak until the 1980s, when the government encouraged lowland farmers to start coffee production: coffee was used to repay debt to the Soviet block and Vietnam. Coffee production was mainly carried out by small farmers, with the government acting as a coordinator for the collection and export of the coffee. In the mid-1990s, the government began to encourage private sector investment in coffee production. Coffee was promoted as an export commodity to diversify exports and many private investors entered coffee trading during the mid-1990s when the world market prices reached record levels. As a result, total production volume grew by a factor of five during the 1990s. Thanks to the good physical conditions for coffee cultivation, Lao coffee is known for its high quality, and Europe has remained the main export destination even after the collapse of the Soviet block: Germany and France are the most important individual export markets.

Until the first half of the 2000s, Lao coffee producers could be divided into three categories: small plantations with an area of 4-10 hectares, smalll farmers growing coffee in combination with other crops on a cultivated area of 1-3 hectares, and small farmers with a variable area for coffee production as a source of supplementary income when coffee prices were high. The individual farmers were generally not in direct contact with the market, but relied on pick-up agents, who bought coffee from farmers and sold to

wholesalers and exporters, who delivered the green beans to their foreign customers. Each of the links in the value chain were clearly separated: the farmers cultivated the coffee, pick-up agents collected the coffee and transported it to wholesalers, and the wholesalers and exporters secured the necessary documents relating to country of origin and phytosanitary status of the coffee shipment. Roasting, milling, and packaging for the consumer market were done by the foreign customers. Since then, the Lao coffee industry has changed substantially.

In 2002 the world market for coffee fell dramatically, hurting all participants in the value chain of coffee. It was obvious that a continued focus on exporting green unroasted beans would make Lao PDR vulnerable to world market fluctuations, and that one way to reduce vulnerability was upgrading the value chain to include roasting, packaging, and milling. However, this would require larger firms that could cover the high fixed costs for essential investments in technology and equipment. By 2005, several large-scale producers had indeed emerged in the industry. Apart from growing coffee on plantations that measure 100-200 hectares, they buy large amounts of coffee from surrounding smaller farms, and dry, roast, mill and package the coffee on site. The fact that they control a larger share of the value chain has made it possible to upgrade the quality of the coffee itself (e.g. by controlling irrigation and fertilizer and pesticide use). The stricter quality control has trickled down to the smaller suppliers as well, since procurement prices vary depending on the quality of the coffee delivered to the large firms.

The increase in quality has been particularly important for branding, which is not limited to the export market. New brands and differentiated roasts have been introduced also for the domestic urban markets, and a wide range of new variants are now available at local markets and supermarkets in Pakse, Savannahkhet and Vientiane. While coffee is still a relatively rare example of an agricultural industry that has been able to raise the value added of domestic raw materials, it represents an ongoing development process where local firms are gradually moving upwards in the value added chain, where

production is becoming increasingly complex, and where large firms firms become more important actors. This process has reached further in southern Lao PDR than in the northern parts of the country, as indicated by the higher average income level in the south.

7.4 Effects on Development and Poverty Reduction

Both the northern and southern parts of Lao PDR have been able to benefit from the opportunities created by the economic reforms and the increasing outward orientation of the Lao economy during the past decades, despite the differences in initial development levels and economic structures. In the northern parts of the country, growth has largely been driven by integration with China. While the ultimate driving force for this development may be strong Chinese demand for raw materials, the growth of both formal and informal trade has been facilitated by trade liberalization and infrastructure development. In particular, the Northern Economic Corridor has been important for reducing the transaction costs in trade between Lao PDR and China. The Northern Economic Corridor have been important factor linking markets in Thailand and China where the northern parts of Lao PDR experience spill over effects of this trade. In the southern parts of the country, growth is related to larger-scale exploitation of natural resources. This includes agricultural commodities and wood and wood products, where the production structure is more concentrated than in the north, as well as mining and hydropower, where large fixed costs necessitate a large scale of operations. China appears among the export destinations for the larger producers in southern Lao PDR, but does not have the dominant position it enjoys in the north – Thailand and Vietnam are more important trade partners.

Table 7.6 shows how the average annual per capita consumption developed in the different regions of the country between 1997/98 and 2002/03, when comprehensive household surveys were undertaken in Lao PDR. All major regions recorded higher per capita consumption during the period, in spite of the effects of the Asian crisis that erupted in 1997. Vientiane municipality, which is strongly integrated with the Thai

economy, was an exception: the losses from the high inflation that was created by the macroeconomic instability in 1997 and 1998 had not been fully recovered by 2003. The highest average consumption growth rate was recorded in the southern parts of the country, but also the northern provinces managed to generate a growth rate above the national average.

Table 7.6 Average Annual Growth Rates of per capita consumption 1997/98-2002/03 (percent)

Region	**North**	**Central**	**South**	**Vientiane M**	**Lao PDR**
Growth rate	1.2 %	0.5 %	1.7 %	-0.4 %	0.8 %

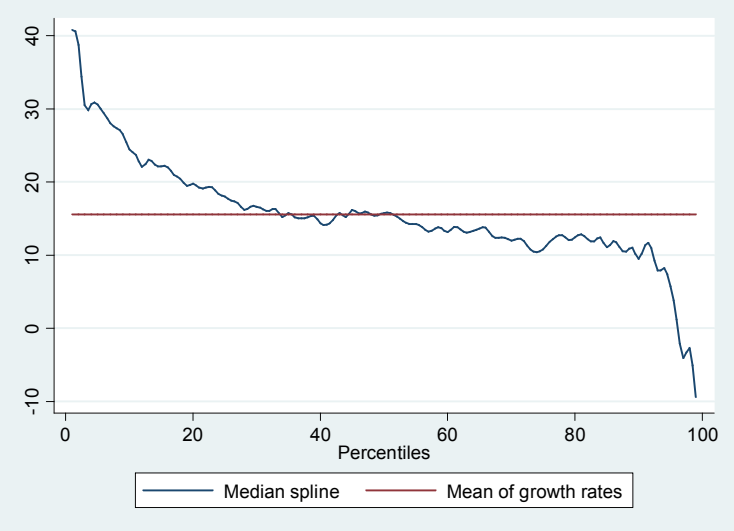
Source: Andersson et al. (2007), Table 1.

However, growth has been distributed very differently in the northern and southern parts of the country. The main characteristic of the development in the north has arguably been that it is "inclusive": the transaction costs for trade with China have been low, and many actors – even small households with limited access to land, capital, and education – have been able to take part in the expanding market economy. The economy of southern Lao PDR is more developed and the role of informal border trade for economic growth is limited. Growth is instead generated by interactions with more distant trade partners – relatively large shipments of coffee, wood products, and minerals are sold to the world market rather than to customers just across the border. The main actors in this development are large firms rather than small farms and households.

In Table 7.3 above, it was noted that incidence of poverty was higher in the northern parts of the country, at the same time as the rate of poverty reduction was faster. Figure 7.6 presents a growth incidence curve for the northern region, and confirms that growth was indeed biased in favor of the poorer population groups. The horizontal axis shows the households in the northern provinces according to their consumption percentile, with the richest households on the far right. The vertical axis shows the aggregate increase in consumption between 1997/87 and 2002/03. On average, consumption grew by about 16 percent over the period. It is interesting and remarkable

that the initially poorest households increased their consumption most, while the households that exhibited the highest consumption levels in 1997/98 recorded the weakest development: for the richest percentiles, there was actually a decline in consumption.

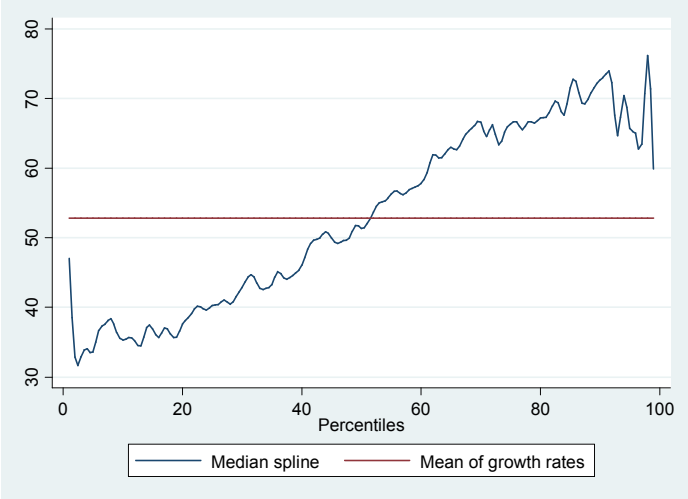
Figure 7.6 Growth Incidence Curve, Northern Laos, 1997/98-2002/03



Source: Author's calculations based on data from the Lao Expenditure and Consumption Surveys.

Figure 7.7 shows the corresponding data for the southern parts of the country. The average aggregate increase in consumption was much higher than in the north, at over 50 percent, but the distribution was very different. In principle, the growth rate was higher the higher the initial income and consumption level. This supports the argument that the main beneficiaries of the high economic growth in southern Lao PDR were relatively affluent households with access to land, capital, and education. In other words, economic growth in the south resulted in increasing income and consumption gaps and higher inequality. However, it is important to note that even the poorest percentiles in the southern parts of the country experienced relatively high increases consumption.

Figure 7.7 Growth Incidence Curve, Southern Lao PDR, 1997/98-2002/03



Source: Author's calculations based on data from the Lao Expenditure and Consumption Surveys.

Contrasting the experiences of northern and southern Lao PDR's relations with China, it is tempting to make a strong distinction between the two kinds of processes seen during the period 1997/1998 – 2002/03. The developments in northern Lao PDR can be characterized in terms of economic integration. The prices for many commodities in China are higher than in Lao PDR, and the possibilities to export to China have recently improved thanks to formal trade liberalization and improvements in transport infrastructure. Since the transaction costs for trade with China are low, it is possible for most farms and households to participate in and to benefit from trade with China. Developments in southern Lao PDR, by contrast, can be described as internationalization. The international prices – or Chinese prices – for many commodities are higher than the local prices, but the transaction costs are also high because the customers are far away. This means that growth is concentrated to sectors with relatively large firms that are able to spread the fixed transaction costs across a high volume of output. In northern Lao PDR, trade appears to have a pro-poor bias, since even small firms and households can profitably sell their produce to Chinese customers. Although the overall rate of growth is lower than in southern Lao PDR, there is a stronger positive impact on poverty reduction.

In southern Lao PDR, trade seems to raise income gaps, since the main beneficiaries are individuals and firms that already have access to land, capital, and education. Yet, there is also a positive impact on poverty reduction: even the poorer population groups seem to benefit from increasing internationalization.

However, for a more accurate comparison between the north and the south, it is also necessary to take into account initial income levels. The positive impact of trade with China in northern Lao PDR is not only due to the fact that trade costs are low, but also related to the low initial development level. The increasing demand from China has made a big impact partly because the economy of northern Lao PDR was so weakly developed until the mid-1990s, when commercial relations between the two countries began to accelerate. Trade with China has contributed to a shift from subsistence farming to small-scale commercial agriculture, which has resulted in gains from international trade as well as gains from market orientation and specialization at the household level. Many of these gains had already been realized in the southern parts of Lao PDR by the mid-1990s – in fact, the higher income and development levels in the south were partly due to established trade links with Thailand and Vietnam. Further growth and development has required a concentration of economic activity to larger units, as well as stronger focus on both human and physical capital. In this perspective, the distinction between northern and southern Lao PDR is perhaps a more generic description of how economies at different stages of development can benefit from international trade. This notwithstanding, China plays a very different role for development in the two parts of the country. In the north, it is the main market and engine of growth; in the south, it is one among several foreign partners.

7.5 Summary and Conclusions

This chapter has examined trade policy, trade, and FDI in Lao PDR, with particular emphasis on the relations with China. The main findings and arguments of the chapter are easily summarized in three points.

- Lao PDR has gradually gone through a trade liberalization process that has contributed to substantial increases in exports, imports, and FDI during the past decade.

- China has not been a major destination for formal exports, although its importance for imports and FDI has increased in recent years. Only a few percent of official exports have directed to China (although there are substantial informal exports to China from the northern parts of Lao PDR). The substantial inflows of Chinese FDI, which are largely concentrated to export oriented activities, suggest that the importance of China as an export destination will increase in the future.

- The character and effects of trade with China are distinctly different in the northern and southern parts of the country. Demand from China has contributed to a shift from subsistence agriculture to commercial farming in the north, and helped reduce poverty in the least developed parts of Lao PDR: the costs for trading with China have been low, and even poor households have been able to benefit from trade opportunities. Because of higher transaction costs (mainly due to weak transport infrastructure), only a few larger firms from southern Lao PDR have been engaged in exports to China. To benefit from these exports, it has been increasingly important to have access to human and physical capital. Exports from southern Lao PDR have also contributed to poverty reduction, but the main benefits have accrued to individuals and households that were initially relatively wealthy.

- The Northern part of Lao PDR have established an efficient land link in the Northern Economic Corridor between Thailand and China.

The differences between the northern and southern parts of the country are interesting, because they reflect two different types of relations to the Chinese market. In the north, local markets are becoming increasingly integrated with the Chinese market, and the low transaction costs for trade with China mean that the effects are widely

dispersed across the regional economy. In the south, China is considered a distant trade partner that is mainly of interest for some sectors where Lao PDR holds strong comparative advantages. While the experiences of northern Lao PDR are probably hard to replicate elsewhere (except perhaps in some of the other weakly developed countries bordering on China), the situation in southern Lao PDR may be similar to that in many other developing countries. China is an important potential market for some commodities, but substantial investment is required to realize this potential and the benefits will not be distributed equally across the population.

The distinction between the north and the south is also related to the initial development levels in the two regions. At the very early stages of development, it may be possible to generate conditions for "inclusive" growth, where large shares of the population are able to benefit from higher prices for agricultural export goods that are produced as a supplement to subsistence farming. At later stages of development, further growth calls for a shift towards higher value added activities that require human and physical capital. Since these assets are not likely to be equally distributed among the population, neither are the benefits of trade and growth. This distinction suggests that the situation in northern Lao PDR will gradually become more similar to that in southern Lao PDR: once the benefits from the first round of integration with China are realized, further gains will require more physical and human capital as well as larger firms.

A notable similarity between northern and southern Lao PDR is that both parts of the country are influenced in a similar way by imports from China. The abundant supply of cheap consumer and capital goods from Chinese (and Thai) producers will hold back the development of a domestic manufacturing industry: it will be difficult for Lao producers to compete with Chinese firms that can build their competitiveness on a large domestic market where both human capital and cheap unskilled labor are plentiful. The changes in the Lao coffee sector, where local firms have gradually been able to upgrade their production and move up the value chain, illustrate a feasible development path also for other resource based industries in Lao PDR.

It is likely that many other developing countries will find themselves in a similar position vis-à-vis China in the future: while there are ample opportunities to benefit from commodity exports to China, there is also tough competition that limits the short-run growth potential in many labor-intensive manufacturing industries. With increasing wages and a gradual reduction of the Chinese surplus of unskilled labor – largely driven by demographic factors – there may in the long run be new opportunities in labor intensive industry for other developing countries, but the short run strategies of many countries should probably focus on gradual upgrading of resource based industries.

8. Conclusions and Contributions

This dissertation has dealt with different aspects of market integration and the spatial structure of freight transport costs in Lao PDR. The main objective of the present dissertation has been to examine the interplay between domestic market integration, transport costs and market structure of the freight transport sector. In the preceding chapters, the dissertation has reported findings on the spatial structure and the cost structure of the freight transport market, discussed the degree of market integration in Lao PDR based on prices for a domestically produced retail product, and explored the relations between the northern and southern parts of Lao PDR and China – in all cases, the analysis has highlighted the importance of transport infrastructure for market integration.

To accomplish the objective of the dissertation, a theoretical framework had to be developed in order to build a suitable empirical framework to study the process of market integration in Lao PDR. The empirical setting was explored in Chapter 4 with the purpose to provide an understanding the special characteristics of the studied context.

This chapter summarizes the analysis undertaken in this dissertation. A number of theoretical reflections are discussed and a number of policy implications and future research directions are suggested. The main conclusions are discussed in next the sections and are arranged in three parts. Part one concerns the empirical part of the dissertation where the nature of market integration is discussed using results from all empirical chapters. The second part relates the empirical results to some theoretical considerations. Finally, the third part discusses implications for the ongoing domestic and regional processes of integration currently taking place in Lao PDR and the Greater Mekong Subregion. It touches upon some possible effects of the processes and discusses some general issues regarding challenges to continued development.

8.1 The Nature of Market Integration in Lao PDR

The broad background interest of the study has been related to the notion of the parallel trends of regional integration in the world economy, the process of decreasing institutional barriers within regional integration programs, and the theoretical connection with the process of domestic market integration. The economic development policies of Lao PDR focused on the introduction of market oriented economic reforms during the late 1980s, which removed most institutional barriers to trade. These reforms together with a large expansion in investments in transport infrastructure during the 1990s contributed to a development of trade between different parts of the country and an emerging market for freight transport services at a national level. However, results in Chapter 4 indicate that regional economic development between 1992/93 and 2002/03 were still spatially diverse with parts of the country lagging behind the overall national development. Changes in poverty rates have also varied across provinces. The most remarkable observation is probably the very rapid reduction in poverty experienced in the northernmost provinces; Huaphan with poverty rates decreasing from 71.3 percent in 1992/93 to 51.5 percent in 2002/03 and Phongsaly with 72.0 percent in 1992/93 to 50.8 percent in 2002/03. Although the overall growth performance of the South was stronger, the average impact on poverty incidence was substantially weaker than in the far North. Where Champasack experianced an impressive 19.0 percent decrease in the poverty rate from 1997/98 to 2002/03. The spatially fragmented development of Lao PDR which was analyzed in Chapter 4 provided useful knowledge for the empircial explorations of the national freight transport system.

The emerging national freight transport system was described and analyzed in Chapter 5. The first part of the chapter described and surveyed the expansion of the freight transport sector since the introduction of the NEM. Within the context of domestic integration and transport infrastructure in Lao PDR, four important elements were seen to influence the transport and logistics system: 1) landlockedness, which creates a dependency on transit traffic through neighboring countries; (2) a geographically

scattered population; (3) weak transport infrastructure that impedes the integration of scattered local and provincial markets; and (4) high dependence on subsistence agriculture.

The first element, the landlocked location, creates a dependency on transit routes to access seaports in the neighboring countries. The results indicate that the freight transport systems are fairly well integrated on routes that connect major border crossing to neighboring countries with the urban center in Lao PDR. The investments carried out by the government to upgrade the national road system have been focused on the national roads system and oriented towards linking Lao PDR with the neighboring countries. The country's national road system is spatially oriented in both north – south as well as east – west directions providing good access to the neighbors to which Lao PDR have most economic interaction, namely China, Thailand and Vietnam. The government's guiding policy to become land-linked rather than landlocked is very clear when analyzing the development of the national road system with strong emphasize on promotion of the logistics internationally linked operations. These heavy investments in the road system also have an impact also on the spatial patterns of freight rates.

The results from the study of the national freight rates shows relatively harmonized freight transport costs terms of Kip per ton-kilometer between Vientiane and the provincial centers accessible on paved roads. Especially provinces located in the central and southern parts of the country exhibit rather harmonized freight rates. However, the results show that the provinces located in the north where elevation is higher and road quality is lower experience higher freight rates. It is worth to note that Oudomxay is an exception as the freight rates on the route from Vientiane to the provincial center in Oudomxay are at same levels as most provinces in the south and central parts of the country. The province's strategic location in the middle of the northern part of Lao PDR where all national roads in the north meet is a factor influencing this exception.

Moreover, the second element identified as a factor influencing the domestic market integration and transport system; the geographically scattered population is especially cumbersome for areas located far from the provincial centers. Generally, the quantitative results in Chapter 5 provided little insights about the freight transport to areas located far from the provincial centers. However, the qualitative parts showed that firms located in districts or villages serve these locations. This market structure reflects the administrative levels in Lao PDR, where each actor serves their own administrative area with little competition from outsiders: firms located in Vientiane can be found to operate at national levels, while actors located in the provincial centers are mainly providing service within their own province (even though there are operators providing services from the provincial center to the capital Vientiane). Freight transport operators are found on all administrative levels from province to district and village levels. Reasons to this could be explained by the local actor's unwillingness to allow competition within their market areas. This is also connected to possible lack of knowledge about local roads and their conditions. A finding from the survey of the market for national freight services indicated that larger operators located in the Vientiane Municipality often subcontract or share shipments with local actors on province or district levels when they receive larger shipments destinated for remote locations. Here the local actors benefit from the geographical constraints which serve as natural barriers to competition.

A regression analysis was conducted to test how a set of variables influence freight rates. The results indicate similar results as discussed above, namely, that road quality and elevation complements distance as main determinants of freight rates on the national market. However competition was a third factor which was identified as a determinant of freight rates between Vientiane and the provincial centers. The variable used as proxy for competition within the province of destination was based on the number of businesses registered in the province. These results can also bring some light to the fourth element identified as a determinant of the weak efficiency of the transport and logistics system of Lao PDR: a high dependency on self-sufficient agricultural. A

province with many businesses registered provides a larger market for freight services than a province solely dependent on self-sufficient agricultural.

The results in Chapter 5 were obtained using qualitative and quantitative research methods. The methods use to analyzing the freight transport service sector followed the directions given by Casavant *et al*. (1995) stressing three distinctive aspects of difficulties to collect data for a study of freight transport services. First, the identification of the operator who actually makes commodity shipping and service decisions is not always straight forward. In order to identify the actors within the freight transport service sector, interviews with not only transport service operators but also with regulators working within the national and provincial governments were conducted. Secondly, Casavant *et al.* (1995) identify problems with identification of the most relevant variables used to describe goods movements. The quantitative part of the analysis focused on freight rates and their determinants; distance, fuel consumption, travel time together with a proxy for competition and market development were used. The lack of data on weight/volumes on the freight shipments between different locations in Lao PDR highlights one of the limitations of the study. Ideally, if weight/volumes on freight transport flows between Vientiane and the provincial centers had been available, this variable could have told us more about the influence of scale economies on the freight transport rates. Finally, different service provider's knowledge and perceptions about the characteristics and attributes of various transport modes may be significantly different from objective measures of the level of service properties. The collection process was therefore divided into several phases and was been based on interviews with key stakeholders and actors within the Lao freight transport sector.

Chapter 6 focused on combining the results from the analysis of the freight transport sector conducted in Chapter 5 with a study of retail prices of beer observed at the village level. The empirical framework of this analysis followed the theoretical framework developed in Chapter 2 and highlighted the theoretical triangulation which was discussed in Chapter 3. An important conclusion of the theoretical framework

combining theories about regional integration with transport studies is that transportation costs can be used to reflect barriers to market integration at a domestic spatial level as illustrated in Figure 2.1. Integration of a domestic market is rarely hindered by customs duties or other regulatory barriers to the movement of goods, which shifts attention to transport costs as a barrier to entry. The theoretical discussion about transport costs and its determinants hold a crucial importance for domestic market integration. The empirical analysis focused on the spatial pattern of the retail price for the locally produced Beer Lao. The rationale behind using a manufactured retail product as the study object is that the production of the good is not dependent on the local context where is it consumed. The pricing of locally produced agricultural goods sold in local markets is dependent on various local factors such as fertility of land, climate, access to irrigation, usage of pesticides and fertilizers, and the quality of products rather than factors associated with transport costs and market varibles such as structure, scale and size of the local market. Focusing on a homogenous manufactured retail product manufactured in one location allowed us to abstract from many of these local determinants and concentrate on the impact of transactions costs and market conditions.

The results from the first part of the analysis indicated that the distance between producer and consumer is not a perfect predictor of the retail price of consumer goods. This conclusion follows the results from Chapter 5 where distance was only one among several varibles having an impact on the freight rates. A very rough price comparison between the retail price in the provincial centers suggests that it is necessary to account for differences in transport costs emanating from uneven road quality, as well as differences related to the degree of competition (or the number of traders) in each location. This results also follow studies conducted on spatial price patterns and market integration in former Zaire and Madagascar (Minten and Kyle 1999 and Minten 1999). The analysis of beer retail prices indicates that transport costs in Lao PDR are not only determined by distance. Road access and the presence of markets are additional important determinants of retail prices at the village level. The results show high average prices and large price variations between villages without access to a road which are interprented to

reflect a high variation in transportation costs and competition on the local marker where the beer was sold. The prices are high not only because it is expensive to transport Beer Lao to villages lacking road access, but also because there is not likely to be much competition between retailers on village markets.

Market size can also be assumed to influence the price pattern. Large villages should exhibit lower prices, since they should attract a larger number of sellers. Villages were divided into large villages, with more than 50 households; and small villages, with fewer than 50 housholds. The expected pattern, with a lower price in large villages, holds for urban and rural villages with road access, but not for rural villages without road access. This is very interesting, and suggests that the entry barriers for traders acting in villages without road access are quite high. The result that larger villages without road access record higher prices indicates that they do not attract more sellers: instead, it is likely that the incumbent seller just meets more demand which allows him or her to raise prices. In these cases, improved road access would not only result in lower prices because of the reduction in transport costs, but also because of the reduction in entry barriers and the marker power of traders.

The spatial price patterns were analyzed in two steps; firstly by analyzing the descriptive statistics, and secondly by estimating the determinants of beer retail prices using an ordinary least squares regression framework. The results from the regression models confirm the patterns and conclusions from the descriptive analysis of the beer retail prices. It is not surprisingly that the transport related variables, distance to provincial center and travel time to provincial center, have a positive impact on the retail price. Moreover, the amount of agricultural land in the village used as a proxy for the economic size of the local economy shows a positive effect on the retail price and can be interpreted to mean that traders in a wealthy village set the prices to reflect what their customers are willing or able to pay. Customers in a wealthy village tend to be willing to pay higher prices. Also the population confirms the pattern showed in the descriptive analysis that in villages with a large population and with access to road has a negative

impact on prices. Travel time to provincial center was used as proxy for freight rates based on its high correlation with the estimated freight rates used in Chapter 5. Its not surprising that increasing travel time provides higher retail prices and that the variable is the strongest determinant for beer prices.

The dissertation's empirical parts have examined the market integration process by surveying the spatial price patterns for one bottle of Beer Lao and its pricing's relationship to various market characteristics. Moreover, the results have confirmed the importance of an efficient freight sector in order to develop a successful integration of the local economy into regional and international market.

The last empirical chapter has taken a different perspective of integration. Whereas Chapter 5 and 6 entirely focused on the domestic aspect of market integration and the internal factors influencing the degree of market integration Chapter 7 took a somewhat different perspective. By using the results from Chapter 4, which highlighted the fragmented and uneven distribution of growth at the national level, this chapter focused on some regional north – south patterns in growth and development.

The particular features of the domestic Lao market mean that the experiences of Lao PDR can be used to illustrate two kinds of trade relations with China. The northern part of the country has had ample opportunities to engage in border trade in a wide variety of products, thanks to relatively low entry barriers in terms of transport and transactions costs. Southern Lao PDR, by contrast, has faced higher costs in its trade with China, which has limited the range of products that can be exported and imported. If the first of these cases is described as "integration", the second one illustrates "internationalization" and its impact on "domestic integration".

8.3 Theoretical Contributions

One of the main purposes of this dissertation was to tie the empirical analysis of domestic market integration in Lao PDR closely with a theorectial framework. The main advantage of this research process may be to secure that the formulation of theories

moves in a direction consistent with the empirical data. The weak theoretical understanding of how regionalization and integration play out in developing countries is explained by the fact that most successful regional integration programs are implimented between developed countries. One purpose of this disseration was to examine and make use of alternative approaches to market integration. The theoretical analyses are thus concerned with the relationship between trade costs, spatial market integration, transport and the market for freight transport services and seek to bridge the conceptual distance between the theories of regional integration. Most traditional theories of regional integration deal with interactions between countries, whereas the focus area of this dissertation concerns interactions between regions in one country. The main theoretical contribution of the research conducted has been to establish a theoretical discussion on linkages between the importance of trade costs for economic growth and development and identification of the expected effects of reduced trade costs within one country. The changes in trade costs (including transport costs) are in traditional regional integration theory treated as exogenous events or policy variables, and little is said about why and how transport costs vary between locations or change over time. Therefore the empirical parts of the dissertation benefited from a more thorough understanding of the role of transport costs, which required a careful analysis of the market for transport services before analyzing the spatial patterns of domestic integration.

8.4 Implications for the Ongoing Domestic and Regional Processes of Integration

Based on the results from the analysis conducted in the dissertation a selection of implications for the ongoing domestic and regional processes of integration can be drawn. These implications are of special importance for policymakers as the ongoing process of regional integration need to be evaluated based on Lao PDR's experiences.

The Lao government's strategy to facilitate the development and construction of physical transport infrastructure and establish a strategy focusing on the country's strategic geographical location as land-link seems to have been successful. The national roads linking Lao PDR with China, Thailand and Vietnam have been upgraded with

support from international donors. This physical side of the regional integration program currently undertaken with the Greater Mekong Subregion Program seem to be well ahead with a North-South Economic Corridor constructed in the north linking Thailand with China via the northern parts of Lao PDR and second economic corridor called the East – West Economic Corridor in the central parts of Lao PDR linking Thailand with Vietnam via Savannakhet province in Lao PDR.

However, the qualitative analysis of the structure of the Lao freight transport sector indicates challenges and risks with the institutional side of the regional integration programs. Lao PDR signed the GMS Cross Border Transport Agreement (CBTA) in 2007. The agreement facilitates the movement of people, freight and vehicles within the GMS. In the agreement there are provisions related to exchange of traffic rights and the number of designated transit licenses per country. The Lao transport and logistics industry is faced with numerous challenges as the market will be liberalized by 2013 under ASEAN, and the Lao government has acceded to some controversial ASEAN protocols such as the one limiting the number of transit trucks to 60 per member country while the CBTA permits up to 500 designated transit vehicles. The local transport and logistics industry which emerged after the introduction of NEM may disappear even before it is strong enough to survive in the expanding market.

There are reasons to be conscious about the implications of these agreements. The proliferation of such agreements is a large challenge for Lao PDR. The Lao government is involved in bilateral, trilateral and multilateral agreements covering international and transit trade, which have different operational modalities according to their respective aims: these are very complicated issues for the government to monitor and implement on the local freight and logistics markets. The implications of deeper regional integration on the Lao freight and logistics sector differ between the northern and southern parts of the country. In the north, local markets are becoming increasingly integrated with the Chinese market even though results in Chapter 6 confirm the effect of formal trade barriers at least for beer produced and imported from China. The close location to China

provides low transaction costs for trade with China giving effects that are widely dispersed across the regional economy in the north. In the southern parts of Lao PDR, China is considered a distant trade partner that is mainly of interest for some sectors where Lao PDR holds strong comparative advantages. While the experiences of northern Lao PDR are probably hard to replicate elsewhere (except perhaps in some of the other weakly developed countries bordering on China), the situation in southern Lao PDR may be similar to that in many other developing countries. China is an important potential market for some commodities, but substantial investment is required to realize this potential and the benefits will not be distributed equally across the population.

A notable similarity between northern and southern Lao PDR is that both parts of the country are influenced in a similar way by imports from China. There is a risk for the abundant supply of cheap consumer and capital goods from Chinese producers will hold back the development of a domestic manufacturing industry: it will be difficult for Lao producers to compete with Chinese firms that can build their competitiveness on a large domestic market where both human capital and cheap unskilled labor are plentiful. The changes in the Lao coffee sector, where local firms have gradually been able to upgrade their production and move up the value chain, illustrate a feasible development path also for other resource based industries in Lao PDR.

8.5 Limitations

It is appropriate to highlight some limitations connected to the present research results and the research design. There are limitations related to the research design as one single product in one single country was selected. There are obvious limitations when studying one single product using a single context. The reason for using one single product, more specifically Beer Lao, is related to the characteristics of the national market for freight. The firm producing Beer Lao has developed the country's largest distribution system and is therefore an interesting product providing insights about the freight transport service sector and the degree of market integration in Lao PDR. The explorative nature of the research and the implications of choosing Lao PDR as the

studied context also highlight the limitations when drawing more implications for other countries.

The sample size of 378 villages utilized in Chapter 6 are too small to conduct an regression analysis based on a stratification of villages, i.e. urban areas, rural villages with road access, or rural villages without wet season road access. The regression analysis would benefit from an analysis using the above stratfication would provide a better understanding of how the rural and urban villages differs in terms of market integration. Futher collection of data in order to better incorporate a more detailed analysis of how road access and market variables such as competition can influence the domestic market integration.

8.6 Future Research

Although the empirical results are satisfactory, there is undoubtedly a need to improve and deepen the empirical testing by further research. Most econometrical tests of market integration and its determinants have relatively low efficiency. This suggests a need for a more detailed analysis of the unexplained variance in the dependent variable. It would furthermore be useful to construct theoretical models where the implications could be directly related to the empirical analysis. There is obviously room for improvement in evaluating the quality of data and the appropriateness of the proxy variables used in the empirical analysis. Future research should focus on collecting better on freight flows in the country, also between provincial centers and districts. To be specific, the lack of data on freight volumes between Vientiane and provincial centers make up a major constraint as our theoretical model on transport demand and pricing of freight rates highlights the effects of economies of scale on the studied freight route.

Moreover, findings highlight the constraints shaped by the low levels efficiency and competition on the domestic market for freight transportation. The Lao government has together with external donors invested in upgrading and expanding the national road system but has unfortunately not been as successful in facilitating the development of an

efficient and well functioning transportation sector. Based on these results it would be interesting to explore the process of how competition on local villages markets and socio-economic patterns change when getting access to physical infrastructure and what role the institutional infrastructure play in this process using time series data by comparing matching pairs among the studied villages in order to compare the socio-economic development between villages.

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APPENDIX 1 List of Interviews

List of Interviewees Consulted for Study of Lao Freight Sector in Chapter 5

Name	Title	Organisation	Date of meeting	Place of meeting
Mr. James A. Nugent	Country Director	Lao Resident Mission, Asian Development Bank	regulary meetings during 2004-2006	
Ms. Marrianne Tegman	Counsellor	Embassy of Sweden, Lao PDR	regulary meetings during 2004-2006	Vientiane, Lao PDR
Mr. Bounthavy Sisouphanthong	Permanent Secretary	Customs Department, Ministry of Finance	regulary meetings during 2004-2006	Vientiane, Lao PDR
Mr. Khemdeth Sihavong	Director of Trade Facilitation Division	Department of Export and Import, Ministry of Industry and Commerce	regulary meetings during 2004-2008	Vientiane, Lao PDR
Mr. Laohoua Cheuching Ph.D.	Deputy Director General	Ministry of Industry and Commerce	regulary meetings during 2004-2008	Vientiane, Lao PDR
Mr. Songsak Saicheua	Director	ASEAN Division II, Ministry of Foreign Affairs	regulary meetings during 2004-2006	
Mr. Sombath Southivong	Senior Infrastructure Specialist	The World Bank formerly Embassy of Sweden, Lao PDR	regulary meetings during 2004-2008	Vientiane, Lao PDR
Mrs. Fuyo Jenny Yamamoto	Economic Affairs Officer	Infrastructure Section,Transport Division, UNESCAP	regulary meetings during 2004-2008	Bangkok, Thailand
Mr. John Moon Ph.D	Chief	Transport Policy Section, Transport Division, UNESCAP	regulary meetings during 2004-2008	Bangkok, Thailand
Mr. R. Alexander Roehrl	Economic Affairs Officer	Transport Policy Section, Transport Division, UNESCAP	regulary meetings during 2004-2008	Bangkok, Thailand
Mr. Masato Abe Ph.D	Economic Affairs Officer	Trade and Investment Division, UNESCAP	regulary meetings during 2004-2008	Bangkok, Thailand
Mr. Christer Holtsberg	Counsellor, Director	SENSA, SIDA	regulary meetings during 2004-2008	Bangkok, Thailand
Mr. Christopher Edmonds Ph.D.	Rural Devlopment Economist	East Asia Department, Asian Development Bank	regulary meetings during 2004-2008	
Mr. Rattanatay Luanglatbandith	Regional Cooperation Economist	Asian Development Bank	regulary meetings during 2004-2008	
Mr. Manabu Fujimura Ph.D.	Professor	College of Economics, Aoyama Gaukin University	regulary meetings during 2005-2008	
Mr. Peter G. Warr Ph.D.	Professor	Research School of Pacific and Asian Studies, Australian National University	regulary meetings during 2005-2008	
Mrs. Tongta Khiewpaisal	Programme Manager	UNDP	February, 2006	Bangkok, Thailand
Mr. Carlo Filippo Marsico	Attache (Cooperation)	Delegation of the European Commission, Bangkok, Thailand	February, 2006	Bangkok, Thailand
Mr. Olivier Cogels Ph.D.	CEO	Mekong River Commission	March, 2006	Bangkok, Thailand
Mr. Chuchai Udompote	Chief of Maesai Customs House	Royal Thai Customs	April, 2006	Chiang Rai, Thailand
Mr. Chesda Jeratheranard	Vice President	C.P. Group	April, 2006	Chiang Rai, Thailand
Mrs. Nannapatt Pannathornsate	Deputy Trade Manager	C.P. Group	April, 2006	Vientiane, Lao PDR
Mr. Chula Sukmanop Ph.D.	Senior Expert in Policy & planning	Ministry of Transport	April, 2006	Chiang Rai, Thailand
Mr. Masami Ishida Ph.D.	Senior Research Fellow	Institute of Developing Economies	May, 2006	Tokyo, Japan
Mr. Souknilanh Keola	Research Fellow	Institute of Developing Economies	May, 2006	Tokyo, Japan
Mr. Yoshihiro Araki	Director	Overseas Research Department, JETRO	May, 2006	Tokyo, Japan
Mr. Tomoyuki Furutani Ph.D.	Associate Professor	Faculty of Policy Management, Keio University	May, 2006	Tokyo, Japan
Mr. Bounta Onnavong Ph.D.	R&D and International Cooperation	National Transport Committee, Ministry of Public Works and Transport	regulary meetings during 2006-2008	Vientiane, Lao PDR
Mr. Sengsavang Phandanoungvong	Technical Staff	National Transport Committee, Ministry of Public Works and Transport	regulary meetings during 2006-2008	Vientiane, Lao PDR
Mr. Vichit Sadettan	Sales Manager	Lao Freight Forwarder	regulary meetings during 2006-2008	Vientiane, Lao PDR
Mr. Phahlakhone Sy Boon Heung	Marketing Manager	Asia Petroleum Co. Ltd	regulary meetings during 2006-2008	Vientiane, Lao PDR

Mr. Sengxay Phousinghoa	Private Sector Development Specialist	The World Bank	February, 2007	Vientiane, Lao PDR
Mr. Mats Arvesten	Team Leader	Roads for Rural Development Project, SweRoad	February, 2007	Vientiane, Lao PDR
Mr. Phosavang Chasane	Vice-President	K.P Company Limited	February, 2007	Vientiane, Lao PDR
Mr. Sisouphonh Sihalath	General Manager	Dao - Heuang Group	February, 2007	Vientiane, Lao PDR
Mrs. Sounthaly Lengsavath	General Manager	Souksavath Transport Service	February, 2007	Vientiane, Lao PDR
Mr. Somphone Phasavath	Deputy Managing Director	Lao Freight Forwarder	February, 2007	Vientiane, Lao PDR
Mr. Bounhieng Lattanavong	HR & Administration Manager	Laos Representative Office, Unilever Thai Trading Limited	February, 2007	Vientiane, Lao PDR
Mr. Guy Apovy	CEO	Assurances Generales du Laos	February, 2007	Vientiane, Lao PDR
Mrs. Munchula Siricharoen	Officer	Neighbouring Countries Economic Development Cooperation Agency	February, 2007	Bangkok, Thailand
Mr. Choen Krainara	Policy and Plan Anlyst	Office of the National Economic and Social Development Board	February, 2007	Bangkok, Thailand
Mr. Banchong Amornchewin	Director	Thailand International Development Agency	February, 2007	Bangkok, Thailand
Mrs. Wattanawit Gajaseni	Programme Officer	Thailand International Development Agency	February, 2007	Bangkok, Thailand
Mr. Khamdy Atsayavong	Director	Coffee Research and Experimentation Center KM35	March, 2007	Paksong, Lao PDR
Mr. Sounthone Philavanh	Deputy Director	Lao - Japan Friendship Port, Ministry of Public Works and Transport	March, 2007	Vientiane, Lao PDR
Mr. Khamphou Phomphakdy	Deputy Director	Lao - Japan Friendship Port, Ministry of Public Works and Transport	March, 2007	Vientiane, Lao PDR
Mr. Khamphay Souvatdy	Engineer	Department of Transport, Vientiane Capital	March, 2007	Vientiane, Lao PDR
Mr. Somchith Phengsomphane	Deputy Director	State Land River Transport Enterprise, Ministry of Public Works and Transport	March, 2007	Vientiane, Lao PDR
Mr. Phutthasone Phomvisay	Chief of Trade, Investment Divison	Lao National Chamber of Commerce and Industry	March, 2007	Vientiane, Lao PDR
Mr. Khamphouy Pholsena	President	Savannakhet Association of Road Transport Operators	March, 2007	Savannakhet, Lao PDR
Mr. Bouakham Sisoulath	Governor	Savan-Seno Special Economic Zone Authority (SEZA)	March, 2007	Savannakhet, Lao PDR
Mr. Hong Wei	Principal Economist	Mekong Department, Asian Development Bank	April, 2007	Bangkok, Thailand
Mr. Sounthone Phommachack	Deputy Managing Director	Lao Brewery Co., LTD	April, 2007	Vientiane, Lao PDR
Mr. Dalivanh Phousavanh	Deputy Director	Department of Industry and Trade, Bokeo Province	April, 2007	Houaysay, Lao PDR
Mr. Kham Phay Phetchaleun	Deputy Director	Department of Transport, Bokeo Province	April, 2007	Houaysay, Lao PDR
Mr. Sunsusinh Vongsathone	Deputy Director	Department of Customs, Bokeo Province	April, 2007	Houaysay, Lao PDR
Mr. Vilone Phonsavath	President	Chamber of Commerce, Bokeo Province	April, 2007	Houaysay, Lao PDR
Mr. Kham Phao Syleesouk	Deputy Director	Department of Industry and Trade, Oudomsay Province	April, 2007	Houaysay, Lao PDR
Mr. Chantay Innakhone	Deputy Director	Department of Customs, Oudomsay Province	April, 2007	Houaysay, Lao PDR
Mr. Vong Sack Thammasone	Chief	Department of Transport Louangnamtha	April, 2007	Houaysay, Lao PDR
Mr. Nigel C. Rayer	Director	Transport Division, East Asia Department	October, 2007	Manila, The Philippines
Mr. Ronaldo Antonio Q. Butiong	Economist (Regional Cooperation)	Southeast Asia Department, Asian Development Bank	regulary meetings during 2007-2008	
Mr. Khoun Southammakot	Director General	Department of Export and Import, Ministry of Industry and Commerce	June, 2008	Vientiane, Lao PDR
Mr. Mouavisay Paly	Head of Division	Department of Export and Import, Ministry of Industry and Commerce	June, 2008	Vientiane, Lao PDR
Mr. Khampoun Inpenglasabout	Director	Customs Department, Ministry of Finance	June, 2008	Vientiane, Lao PDR
Mr. Santiphap Phomvihane	Director General	Customs Department, Ministry of Finance	June, 2008	Vientiane, Lao PDR

List of Interviewees Consulted on Issues related to Regional Development and Trade

Ms. Ann-Marie Brathen	Team Leader	Statistics Sweden	regulary meetings during 2004-2006	
Mr. Hans C. Pettersson Ph.D.	Advisor, Consultant	Statistics Sweden	regulary meetings during 2004-2006	
Mr. Phoxai Inthaboualy	Trade Official	Department of Export and Import, Ministry of Industry and Commerce	regulary meetings during 2004-2008	Vientiane, Lao PDR
Mr. Sonemala Nouanthasing	Trade Official	Department of Export and Import, Ministry of Industry and Commerce	regulary meetings during 2004-2008	Vientiane, Lao PDR
Mr. Somboon Siriprachai Ph.D.	Professor	Faculty of Economics, Thammasat University	regulary meetings during 2002-2008	Bangkok, Thailand
Mr. Patrapong Intarakumnerd Ph.D.	Project Manager	National Science and Technology Development Agency	May, 2007	Bangkok, Thailand
Mrs. Sauwalak Kittiprapas Ph.D.	Director	Public Policy Development Office	May, 2007	Bangkok, Thailand
Mr. Wichien Cherdcultrakultong	Vice Chairman	The Federation of Thai Industries Chiang Mai Chapter	April, 2007	Chiang Mai, Thailand

APPENDIX 2 Agenda for Discussion with the Freight Sector in Lao PDR

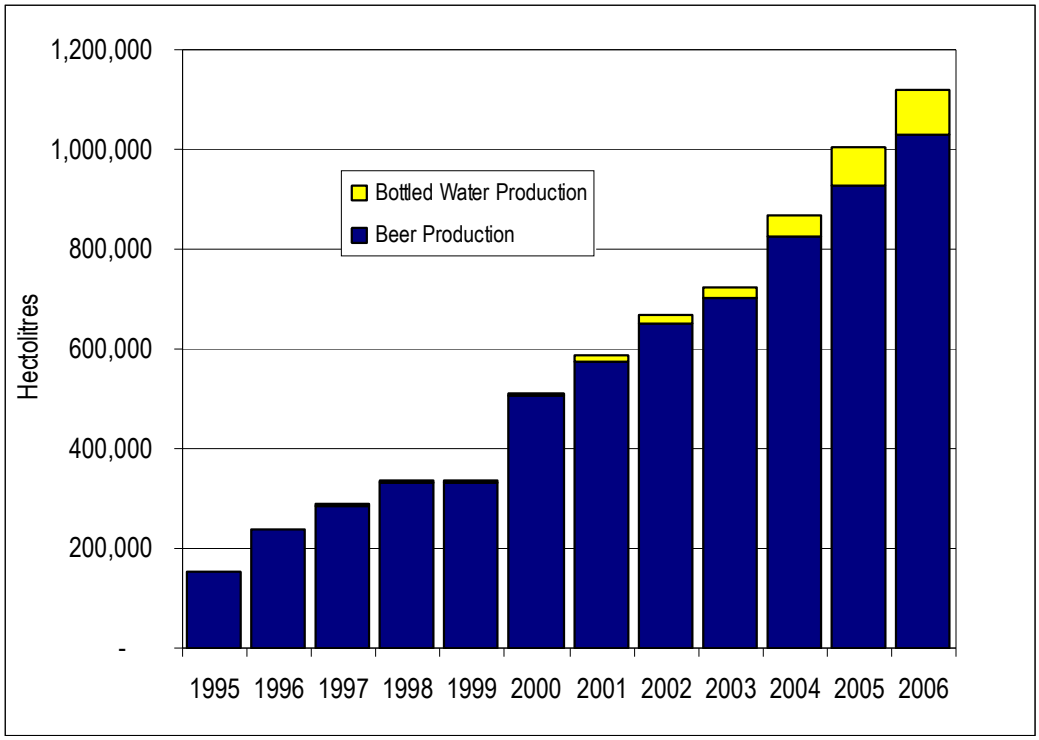
1. What are the consequences of the integration with neighboring countries for the domestic freight service sector in Lao PDR?
2. Are foreign firms a threat to domestic freight service sector?
3. Describe national – regional – provincial – local actors in the sector.
4. Which government regulations govern the sector?
5. Determination of freight rates within the country.
    a. Distance
    b. Size of shipment
    c. Which products are transported?
    d. Fuel costs
    e. Insurance
    f. Orders and communication with customers
    g. Truck fleet
    h. Cooperation and/or competition between actors on different levels in the system
    i. Seasonal changes in demand and freight rates

APPENDIX 3 Company Overview Lao Brewery Ltd.

Company overview Lao Brewery Ltd.

The Lao Brewery Ltd. began operations in 1973 as a joint venture between foreign investment and the Government of Lao PDR. Today Lao Brewery has a similar arrangement with Carlsberg Asia owning 25 percent and TCC, a Thai company who is Carlsberg's partner in Thailand owning another 25 percent, with the Lao Government owning 50 percent of the company. The Lao Brewery production of beer holds approximately 99 percent of the market share in Lao PDR in 2006. Beer and bottled water production have increased significantly over the last 10 years. Figure 1 illustrates the very rapid expansion of production.

Figure 1 Beer and Water Production



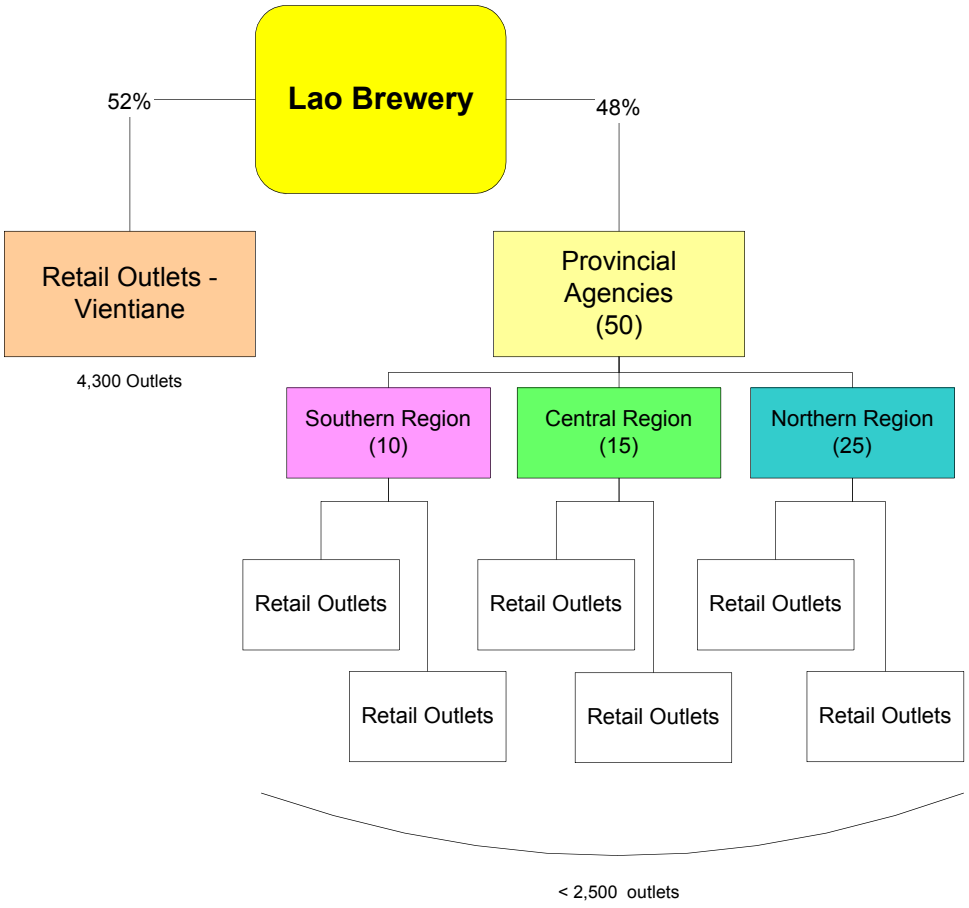
Source: Lao Brewery Ltd

The demand for beer in Lao PDR market exceeds supply. Therefore the Lao Brewery imposes a quota system on the distribution of beer throughout the country. The company also impose strict control of the marketing of beer where price controls to ensure the lack of supply does not drive the prices are used. The two main areas of impact in the near future will be the expansion of capacity of the Lao Brewery (a new production line in at the Vientiane Brewery and the new Brewery at Pakse in the south) and secondly the introduction of competition in 2008 where foreign beer companies invested in Lao PDR and directly compete for market share with the Lao Brewery.

Distribution Network

The distribution of beer occurs through an extensive distribution network as shown in Figure 2. In Vientiane Lao Brewery delivers directly to retail outlets through trucks owned by the company. In the provinces Lao Brewery contracts 3 trucking companies. The distribution is divided into three regions; Northern, Central and Southern. The trucking delivers to the provincial agencies who in turn distribute to the retail outlets. There are always at least two provincial agencies in each province in order to avoid a monopoly market situation. The distribution of beer is approximately 50/50 between Vientiane and the provinces. The distribution network is represented below. The provincial agencies are private companies who are contracted to Lao Brewery to sell to the retail outlets. The price of beer is controlled and the agencies cannot increase their prices greater than 15 percent of what they buy from Lao Brewery.

Figure 2 National Distribution Network



Source: Lao Brewery Ltd

A summary of the outlets is provided in the table below. Most of the retail outlets are in the Vientiane area. The agencies then distribute to the retail outlets in the provinces.

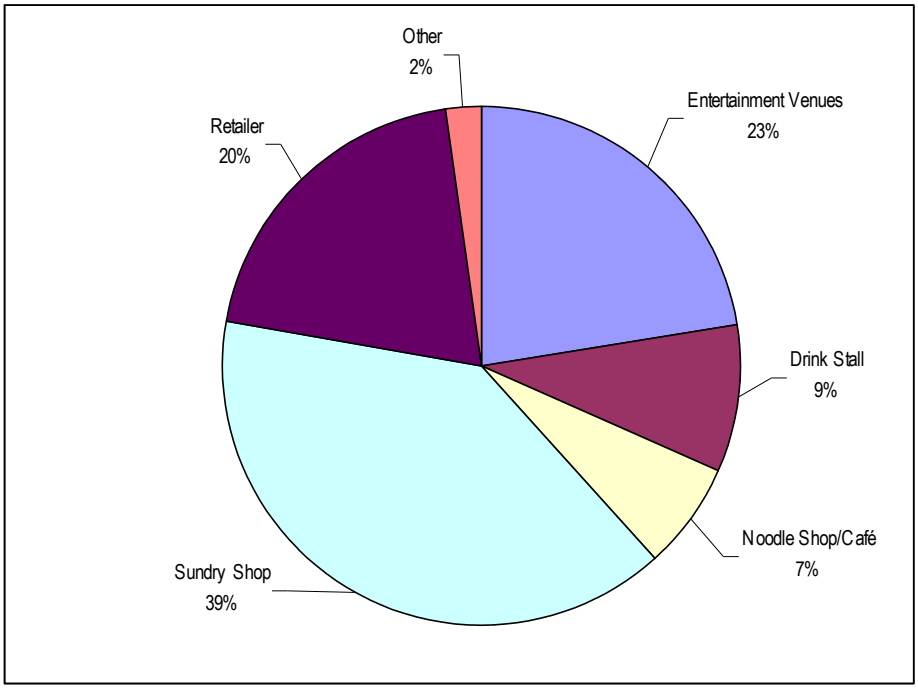
Table 1 Lao Brewery Distribution Network

Location	Number of Agencies	Number of Retailers/Outlets
Vientiane	Direct Distribution	4,300
Northern Region	25	1042
Central Region	15	929
Southern Region	10	562

Source: Lao Brewery Ltd

The main type of retail outlet is predominantly Sundry Shops, Retailers and Entertainment venues (karaoke bars, beer houses, night clubs, restaurants, guesthouses, sports clubs and hotels) as illustrated in Figure 3. The predominant form of selling beer is through what has been defined as Sundry shops. These shops can be described as micro-enterprises – they are family operated businesses providing income for the immediate family and they may not employ other people, except for family members. In this sense the people that work in these shops may be described as deriving income from this business rather than being described as being employed by these businesses. The entertainment venues differ in size (number of employees). Drink stalls are similar to sundry shops in terms of size (perhaps smaller in that they may only employ one person).

Figure 3 Type of Supplier of Beer

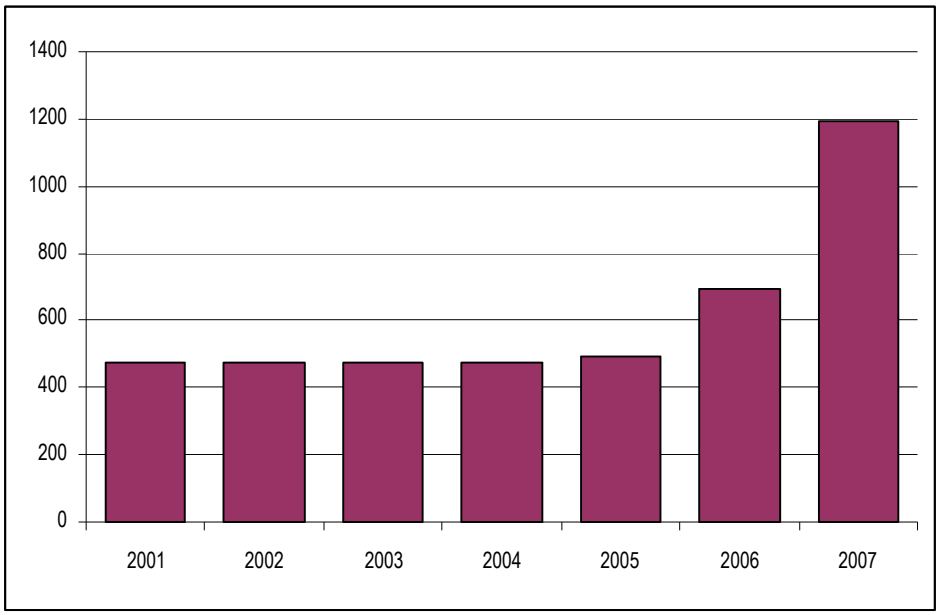


Source: Lao Brewery Ltd

Employment

Lao Brewery is not a large employer (direct employment). There are however larger spillover impacts on indirect employment. The Lao Brewery currently employs directly about 500 workers. These include office staff, management staff and workers in the beer production facility.

Figure 4 Employment Numbers, Lao Brewery

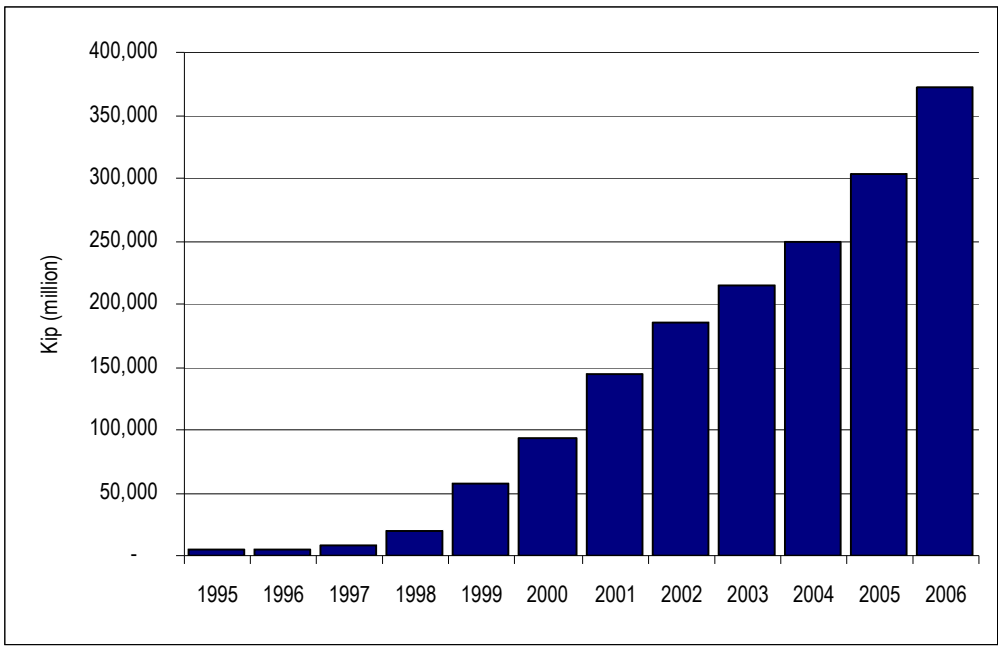


Source: Lao Brewery Ltd

Revenues to Government

The company is a significant contributor to the revenues of the government. In 2005 the taxes and dividends paid to government was approximately US$31 million and in 2006 US$38 million. These revenue levels are expected to increase as a result of the increased production capacity. The advent of competition however has not been factored into the equation. Government revenue could decrease as a result of decreased sales if consumers move away from Beerlao to other beer products.

Figure 5 Taxes and Fees Paid to Government



Source: Lao Brewery Ltd

Inputs to Production

In terms of cost much of the inputs of production for the Lao Brewery are sourced from overseas. The main inputs sourced locally are transportation, rice, water for beer and bottled water products, packaging for water bottles, cartons and labels. The rest is sourced from overseas, such as the beer bottles, malt, bottle caps etc. The company follows the policy of the government and attempts to source inputs locally as much as possible.

Transportation

Lao Brewery contracts the services for beer transportation to the provinces to three transport and trucking companies to a value of US$4.3 million. A competitive bidding process is undertaken and contracts awarded on a two-yearly basis. The three

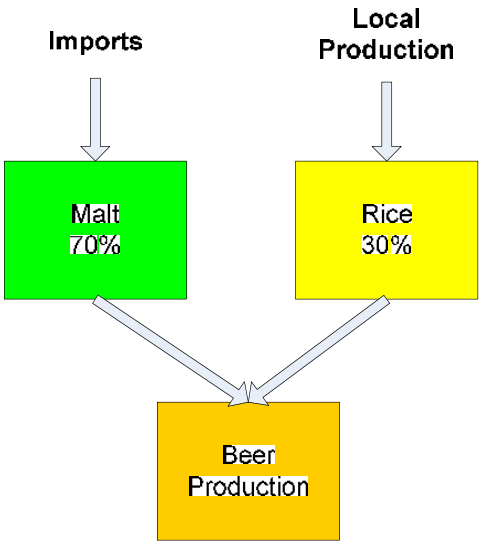
companies service the Northern, Central and Southern regions respectively. Each company is estimated to employee around 50-60 workers, including drivers, handlers, and administration staff. This implies that around 150 to 180 people are employed just in relation to the transportation of Beerlao to the provinces.

The Chansy Transportation Service began its transport contract with Lao Brewery in 2000 and currently employee 20 people. Approximately 80percent of their business is associated with Lao Brewery. As a result the business expanded due to the contract with Lao Brewery and they employed more people (from 2 to 20 people). The contract meant certainty in the amount of work and income the company would have over a given period. This lead to increased employment numbers and an expanding business into other areas (not related to transport). This company services the Northern Region and ships about 6,000 cases of beer per week. They also subcontract to some smaller companies in more remote areas to undertake distribution.

Rice Production

The production of beer requires raw materials such as malt (70 percent) and rice (30 percent). The malt is imported from Europe where the rice is sourced from local farmers in Lao PDR (in the Vientiane District). Approximately US$1.9 million is spent on purchasing rice each year. This figure will increase as the Lao Brewery increases its production.

Figure 6 Production process



Source: Lao Brewery Ltd

In 2005 5,400 tons of rice were purchased and in 2006 6,600 tons of rice were purchased from local farmers. The company does not deal directly with the farmers, instead they contract "traders" to purchase the required amount of rice. There are currently 9 traders who have contracts with Lao Brewery. The company estimates that approximately 1,400 farmers were supplying rice for beer production in 2005.

The price paid for rice is set through a process of negotiation between the Ministry of Agriculture, the Company and the Traders. The price paid to the traders in 2006 was 2,950 Kip per kilogram. This price is negotiated every year. The farmer receives around 2,500-2,600 Kip per kilogram. Therefore the farmers would receive around $US1.7 million in total or approximately US$1,250 per farmer in 2006.

In the past there were problems in meeting the supply requirements for rice. Farmers were not able to produce enough and hence imports from Vietnam were

required. Another issue in terms of reliability of supply was related to the prices set for rice. If a farmer was offered a higher price (higher than the price offered by the trader) then the rice would be sold to another buyer. The Company did not have a reliable supply as a result and made up the short fall from imports. Increases in general rice production in Lao PDR over the last few years (due to government policy initiatives and programs) meant that supply has been greater and for the last five years or so Lao Brewery has been able to source all the rice they require from local farmers. The reliability of supply has become an issue recently however since the demand for other types of rice (sticky rice) has increased and thus increasing prices, making these types a more attractive crop to produce when compared to the type of rice required for beer production. The price for sticky rice has increased from 2,500 Kip per kilogram to around 3,500 Kip per kilogram. Reliability of supply could be a problem in the future as more farmers substitute towards this higher value crop.

Suppliers of cartons, printing and plastics for water bottles

The company purchases inputs locally for cartons, packaging materials and water bottles to the value of approximately US$2.3 million per annum. The raw materials of plastics, paper and cardboard are imported from Thailand and the requisite products are then produced by Lao companies for supply to Lao Brewery. The procurement department of Lao Brewery estimates that the companies involved employ around 100 workers.

Impact on Local Suppliers

Suppliers of raw materials and services, such as rice, will have increased incomes. The transportation of the beer is undertaken through an extensive network. The main transport companies (who have direct contracts with Beerlao) also subcontract to other smaller transport enterprises in more rural areas. These downstream linkages provide incomes and jobs for enterprises in rural areas. For example, the subcontracting of other smaller transport enterprises to undertake distribution of the product in more remote areas

demonstrates further downstream linkages and potential for flow-on effects or indirect benefits.

Further employment will be generated with the establishment of the new beer production plant in Pakse and the third production line in the Vientiane Brewery. It is estimated that the Pakse plant and the "third line" will create at least 500 more jobs. The total amount of wages and salaries paid to employees in 2004 was approximately US$1 million, and in 2005 it was US$ 1.2 million. This will increase progressively over 2007 and 2008. Figures for this increase are not available. This does not include the salaries of the people employed in beer promotion activities. Currently much of the income going to employees is situated in the Vientiane area. Once the Pakse plant begins operations, this will add to the income flows in that region, creating flow-on income effects and further employment generation. When the new Pakse plant is producing beer at the end of 2007 it is estimated that a further 3,000 tons of rice per year will be required. This equates (at current prices) to approximately US$785,000 being paid to local farmers in the Pakse area.

APPENDIX 4 The Lao Expenditure and Consumption Survey 3

The purpose of this appendix is to present the household survey including questionnaire.

The first Lao Expenditure and Consumption Survey (LECS) was conducted in 1992/93. The second survey was conducted in 1997/98. This paper describes the third LECS survey (LECS-3), conducted in 2002/03. The surveys have been conducted as part of the SIDA - financed cooperation project between the National Statistics Department formerly known as National Statistics Center (NSC) of Lao PDR and Statistics Sweden.

Data from the surveys are used for a number of purposes, the most important being to produce estimates of household consumption and production for the national accounts. This includes estimating production in household agricultural activities and business activities. Another important use of the data is for the conduction of poverty analyses.

Measurement of Household Consumption

Household consumption is an important variable in the survey. In order to get accurate measurements of the consumption it was decided to ask the households to keep a diary of their transactions. The measurement of daily consumption through a diary kept by the household puts a heavy burden not only on the households but also on the field interviewers. Many households, especially in the rural areas, need frequent support in the task of keeping the diary. In order to secure an acceptable quality in the data it was deemed necessary to keep the interviewers in the village for the whole month rather than having the interviewers travelling to the villages for repeated interviews and follow-up.

Measurement of Household Production

Large parts of the value added and labor input concerns household production in agriculture or informal household activities. In order to capture the production three

modules were included in the LECS: 1) A "light" time diary is used to capture time use for members of the household that are 10 years and above. This enables measurement of labor input in hours in the Lao economy. 2) Two modules on agricultural and household business operations were included. This makes it possible to calculate value added in household production in agriculture and informal business activities.

The 'light' time use diary used in LECS-3 has been developed jointly by Statistics Sweden and ESRC Research Centre on Micro Social Change at the University of Essex. The diary contains 22 pre-defined activities with a pronounced emphasis on economic activities. For some of these activities, the interviewer probes for additional information at the time when the diaries are collected. Those who mark time for *worked as employed* are asked whether it is as farm worker, in the governmental sector, in the private sector, or something else. Those who mark time for *own business work* are asked what they do in that business work.

The Household Questionnaire

A large part of the household questionnaire remains the same as in previous surveys, except for some modifications in questions that didn't work well in LECS-2. Some topics, mainly housing, health, agriculture and time use, have been expanded. The household interview is consequently somewhat longer in LECS-3. The new modules/variables are underscored in the list below.

First week interview:

- Household composition (age, sex, relationship to head of household, marital status, ethnic group),
- Parents education (highest level completed),
- Education (literacy, highest level completed, reasons for not attending school),

- Labour force module (work during last week, reasons for not working, activities last 12 months) ,
- Victimization module (whether victim of burglary, robbery, theft, violence)

Second week interview:

- Health check, only children (weight, height),
- Possession of durables (type, value),
- Housing conditions (building material, water, toilet, source of energy forr cooking),
- Construction activities (kind of construction, costs).

Third week interview:

- Household businesses module (sector, number of employees or family members working, sales),
- Agriculture module (crops, areas, production, fertilizers, livestock, fishery, forestry),
- Time use.

Fourth week interview:

- Health module (self-rated health, long-term ilnesses or disabilities, health complaints, visits to health care facilities, use of medicines),
- Purchasing and selling of durables (type of item, value),
- Income and transfers (type of income, type of transfers, value),
- Household borrowing (reasons for borrowing, amount, security, interest rate),
- Household lending (amount, interest rate).

Other Questionnaires

Three other questionnaires were also administered during the month (new modules/variables for LECS 3 are underscored):

- *Village questionnaire*. A village questionnaire was administered to the head of the village. The questionnaire covers roads and transport, water, electricity, health facilities, local markets, schools etc. This questionnaire is the main source of information of the analysis conducted in Chapter 6. For more information see the village questionnaire below.

- *Primary school questionnaire*. Interviews were made with the school principal and the teachers. Data were collected on pupils, school facilities, management of the school, finances and sources of support. The principal and the teachers were also asked questions about the decision-making in the school.

- *Price questionnaire*. Collection of local prices on 121 commodities at the village market.

Sample Design for LECS-3

The sample consists of 8100 households selected through a two-stage sample design. A random sample of villages was selected in the first stage. The villages were stratified on eighteen provinces and within provinces on urban/rural sector. The rural villages were further stratified on villages with "access to road" and "no access to road". The total first-stage sample consists of 540 villages. 15 households were selected with systematic sampling in each village, giving a sample of 8100 households.

Field Staff and Field Work

The field staff consisted of 180 interviewers organized in 90 two-member teams. 36 supervisors from the provincial statistical offices and 10 central supervisors from head

office supervised the teams. The interviewers are permanent staff at the provincial and district statistical offices.

The field work was spread evenly over a 12-month period starting in February 2002, on average 45 villages were visited each month. The teams' first duty in the village was to present the survey to the village head and to obtain/prepare a list of households. The team then selected a systematic sample of 15 households according to a predefined procedure.

The completed questionnaires were brought to the provincial statistics office after the survey month and further checked. Data entry was done at NSC in Vientiane.

Each team worked in the field six months during the survey year. The team worked in the villages every second month, the other months they performed other duties in the district or provincial office. Each team thus covered six villages. Transportation to and from villages was done by office vehicles and by public transport (mostly buses). Some of the remote villages required travel by foot for several days.

Accuracy of the Estimates From the Survey

The survey was designed to provide accurate estimates on national level and estimates of reasonable accuracy on province level. It will not be possible to present estimates on district level. Whether it will be possible to present estimates for certain subgroups depends primarily on the size of the subgroup and the geographical distribution of the subgroup. For example: it will not be possible to present estimates for small ethnic groups confined to a rather small part of the country.

Questionnaire

I	Organizations, services				
No.	*Question*	*Alternative Answer*	*Answer code*		*Skip to*
			Yes	*No*	
1	Are there any of the these	*1 = Party?*	1	2	
	organizations in the village ……	*2 = State power?*	1	2	
		3 = Lao Women's union?	1	2	
		4 = Youth league?	1	2	
		5 = Trade union?	1	2	
		6 = Village community?	1	2	
		7 = Pupils parent committee?	1	2	
		8 = Other? (Specify) ..-..-..-..-..	1	2	
		..-..-..-..-..-..-..-..-..-..-..-..-..-			
2	Which of these public services are	*1 = Trade Union?*	1	2	
	available in this village …..	*2 = Rice bank?*	1	2	
		3 = Cattle bank?	1	2	
		4 = Credit sources of	1	2	
		financial institution?	1	2	
		5 = Farmers group's shop?	1	2	
		6 = Others?	1	2	
3	How many persons live in this	*Number of people*	……		
	village?	*Of which: females*	……		
4	How many persons were born in this village during the last 12 months, that is from …… to ……..	*Number born*	……		
5	How many persons of this village died during the last 12 months?	*Number died*	……		
6	How many persons have moved in to and moved out from this village in the past 12 months?	*Number moved in*	……		
		Number moved out	……		
7	In which type of geographical area is this village situated?	*1 = Lowland*	1		
	Definitions:	*2 = Upland*	2		
		3 = Both lowland and upland	3		
8	Now a few questions about crime.	*Problem:*	*Major*	*Minor*	*No*
	Is …… a major, minor or	*1 = Burglery*	1	2	3
	no problem in the village?	*2 = Robbery*	1	2	3
		3 = Fighting, brawls	1	2	3
	ASK ABOUT ALL ALTERNATIVES	*4 = Violence against women*	1	2	3
		5 = Killings, murders	1	2	3
		6 = Illegal abortion	1	2	3
		7 = Drugs (cultivate, sell, use)	1	2	3
		8 = Other crimes	1	2	3

No.	*Question*	*Alternative Answer*	*Answer code*			*Skip to*
II. General economic conditions						
			First	**Second**	**Third**	
1	What are the three main	*1=Agriculture, crops*				
	sources of income for people	*2=Agriculture, livestock*				
	living in this village?	*3=Forestry*				
		4=Fishing				
	LIST IN ORDER OF	*5=Industry/handicraft*				
	IMPORTANCE	*6=Trade*				
		7=Construction				
		8=Other services				

2	According to you, has the living standard of people in this village improved or declined compared to 5 years ago?	*1 = Improved* *2 = Declined* *3 = The same*	1 2 3	
3	Are there any current development projects in this village? *Definition:*	*1 = Yes* *2 = No*	1 2	GO TO III1
			Yes ***No***	
4	What kinds of development project? With ……..? (ASK ABOUT ALL ALTERNATIVES)	*1 = Crops?* *2 = Irrigation?* *3 = Forestry?* *4 = Commerce?* *5 = Transport?* *6 = Handicraft?* *7 = Education?* *8 = Health?* *9 = Water and sanitation?* *10 = Other? Specify……*	1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	
5	Is this/are these project(s) funded by ……. *(Projects can have move than one fund. Different projects can have different funds).*	*1=The village?* *2 = Bank loans?* *3 = Government budget?* *4 = Int. org loans/grants?* *5 = Other? Specify……*	1 2 1 2 1 2 1 2 1 2	
III. Land and land use in the village				
1	How big is the total land area in this village ?	*Total area in hectares:*	……. Ha	
2	What is the total agricultural land in the village?	*No agricaltural land:* *Area in hectares:*	1 ……Ha	Go to IV
3	How much is grazing land? Forest land? Other land?	*Area of grazing land:* *Area of forest land:* *Area of other land:*	……Ha ……Ha ……Ha	
	Make sure Q2 and Q3 sum up to Q1!			
No.	***Question***	***Alternative Answer***	***Answer code***	***Skip to***
4	How much of the agricultural land was irrigated in the last dry season?	*Area of irrigated land:*	……Ha	
5	How much of the agricultural land is located in lowland and upland respectively?	*Percent in lowland:* *Percent in upland:*	…… Percent …… Percent	
6	Has there been any land and forest allocation program implemented up to now in this village?	*1 = Yes* *2 = No*	1 2	
IV. Infrastructure				
1	***Interviewer observe:*** Has this village access to road? *Definition:*	*1 = Yes* *2 = No*	1 2	GO TO 3
2	From this village how far is it to the nearest road?	*Distance:*	…… KM	GO TO 7
3	Is it possible to reach this village by truck (car) in dry season ?	*1= Yes* *2= No*	1 2	
4	Is it possible to reach this village by truck (car) in rainy season ?	*1= Yes* *2= No*	1 2	

5	Is there any scheduled passsenger	*1= Yes*	1	
	transport stopping in this village ?	*2= No*	2	GO TO 6
6	How often is this public transport	*Time per day:*	……../Day	GO TO 8
	available according to its schedule?	*Time per week:*	……../Week	GO TO 8
		Time per month:	……../Month	GO TO 8
7	How far do the villagers have to go to			
	catch a public transport (that runs all year around)?	*Distance:*	…… KM	
8	How far away is the DISTRICT	*In village:*	1	GO TO 10
	administrative headquarters?	*Distance:*	…… KM	
9	How long does it normally take to		…… Hours	
	get there by the most common way?	*Time in dry season:*	…… Minutes	
	In dry season?		…… Hours	
	In rainy season?	*Time in rainy season:*	…… Minutes	
10	How far away is the PROVINCE	*In village:*	1	GO TO 12
	administrative headquarters?	*Distance:*	…… KM	
11	How long does it normally take to		…… Hours	
	get there by the most common way?	*Time in dry season:*	…… Minutes	
	In dry season?		…… Hours	
	In rainy season?	*Time in rainy season:*	…… Minutes	

No.	***Question***	***Alternative Answer***	***Answer code***	***Skip to***
12	Is this village connected to an electric	*1= Yes*	1	
	network?	*2= No*	2	GO TO 14
			Yes ***No***	
13	Does this village get	*1= Government network?*	1 2	
	electricity from …….	*2= Government generator?*	1 2	
		3= Private generator?	1 2	
		4= Battery/Dynamo?	1 2	
		5= Other? (Specify)	1 2	
		..-.		
14	Is there safe water in this	*1= Yes*	1	
	village ?	*2= No*	2	
15	Is there a permanent (daily) market	*1= Yes*	1	GO TO 18
	in this village ?	*2= No*	2	
16	Is there a periodical market	*1= Yes*	1	
	in this village ?	*2= No*	2	GO TO 18
17	How often is this periodical market			
	open?	*Times per month:*	…… Times	
18	How far is the nearest post office?	*In village:*	1	
		Distance:	…… KM	
V. Education				
1	How many children in school age are	*Children 6 - 10:*	……	
	there in this village?	*Children 11 - 15:*	……	
2	How many girls and boys in the	*Girls 6-10:*	……	
	village are currently enrolled in	*Boys 6- 10:*	……	
	school?	*Girls 11-15:*	……	
	(In village or elsewhere)	*Boys 11- 15:*	……	
			Yes ***No***	
3	Is there a …… located in	*1= Primary school?*	1 2	
	this village?	*2= Lower secondary school?*	1 2	
		3= Upper secondary school?	1 2	
	ASK FOR ALL ALTERNATIVES	*4= Technical school?*	1 2	
		5= Institute?	1 2	
		6= University?	1 2	
			If primary school: GO TO 4	
			If no primary school: GO TO 9	

4	Are any teacher text+B188books available in the primary school classes? Definition:	*1= Yes* *2= No*	1 2	
5	How many permanent teachers are working in this school ?	*Number of teachers:*	..... Pers.	
6	Is this school operating regularly?	*1= Yes* *2= No*	1 2	
7	Is this school operating twin classes?	*1= Yes* *2= No*	1 2	
8	Is this school operating shift classes?	*1= Yes* *2= No*	1 2	GO TO 10 GO TO 10
No.	***Question***	***Alternative Answer***	***Answer code***	***Skip to***
9	How far is the nearest primary school attended by children of this village?	*Distance:*	..... KM	
10	How far is the nearest secondary school attended by children of this village?	*In village:* *Distance:*	1 ..... KM	
11	Has there been any adult literacy program in this village in the last 5 years?	*1 = Yes* *2 = No*	1 2	
VI. Health care				
1	Is there a Medicine Bag in the village?	*1= Yes* *2= No*	1 2	
2	Is there a Traditional Birth Attendant (TBA) in this village ?	*1= Yes* *2= No*	1 2	
3	Is there a traditional healer in this village ?	*1= Yes* *2= No*	1 2	
4	Is there a functioning community health worker living in this village ?	*1= Yes* *2= No*	1 2	
5	Is there a medical practitioner/trained nurse living in this village ?	*1= Yes* *2= No*	1 2	GO TO 7
6	Do they take care of the people in the village?	*1= Yes* *2= No*	1 2	
7	How far away is the nearest hospital?	*In village:* *Distance:*	1 ..... KM	GO TO 9
8	How long does it normally take to reach any hospital?	*Time for travel:*	..... Hours ..... Minutes	
9	Is it a government or private hospital?	*1 =Government* *2 = Private*	1 2	
10	Is there a dispensary or health post in this village?	*1 = Yes* *2 = No*	1 2	GO TO 13
11	How far away is the nearest dispensary or health post located?	*Distance:*	..... KM	
12	How long does it normally take to reach the nearest dispensary/health post?	*Time per hours:* *Time per minutes:*	..... Hours ..... Minutes	
13	Is there a pharmacy located in this village ?	*1= Yes* *2= No*	1 2	GO TO 15
14	Is it a licensed pharmacy ?	*1= Yes* *2= No*	1 2	

No.	Question	Alternative Answer	Yes	No	Answer code	Skip to
15	Which of these health problems have been major problems in the village during the last 12 months?	1. Malaria	1	2	LIST IN ORDER OF MAJOR HEALTH PROBLEM First ____ Second ____ Third ____ Fourth ____	
		2. Diarrhoea	1	2		
		3. Respiratory infection	1	2		
		4. Measles	1	2		
		5.Stomach pain	1	2		
		6. Liprosis	1	2		
		7. Skin diseases	1	2		
		8. Eye infection	1	2		
		9. Nervous system	1	2		
		10. Rheumatism	1	2		
		11. Goiter	1	2		
		12. Other ……				
16	Where do most women in this village give birth?	1 = In their homes			1	
		2 = In hospitals			2	
		3 = Other, specify …… ……			3	
17	Has there been any child immunization program in this village during the last 3 years?	1= Yes			1	
		2= No			2	
18	Has there been any anti-malaria program in this village during the last 3 years?	1= Yes			1	
		2= No			2	

VII. Agriculture

If no agriculture in village, if III Question 2 = 1, GO TO SECTION H QUESTION 5

1	What are the FIVE major crops grown by people of this village?	1 = Rice 2 = Maize 3 = Cassava/ sweet potatoes 4=Vegetables 5 = Soybeans 6 = Mungbean 7 = Tobacco 8 = Sugercane 9 = Cotton 10 = Coffee 11 = Banana 12 = Other fruits 13 = Other crops, specify……			LIST IN ORDER OF IMPORTANCE First ____ Second ____ Third ____ Fourth ____ Fifth ____	
2	Is the harvest of the main five crops generally sold …… *Definition:*		Yes	No	LIST IN ORDER OF IMPORTANCE	
		1 = At village markets?	1	2	First ____	
		2 = At district markets?	1	2		
		3 = At province market?	1	2	Second ____	
		3 = To private traders?	1	2		
		4 = To neighbors?	1	2	Third ____	
		5 Other ways? Specify …… ……	1	2	Fourth ____	

No.	Question	Alternative Answer	Answer code	Skip to
3	How many months has this village suffered from lack of rice during the last 12 months?	Number of months:	…… Months	
4	Has this village received a visit of agricultural extension workers during the past 12 months?	1 = Yes	1	
		2 = No	2	GO TO 7
5	What were the two main purposes of the last visit?	1 = Improving farming practice 2 = Encourage conservation 3 = Promote seeds 4 = Promote fertilizers 5 = Promote insecticides 6 = Promote crop 7 = Irrigation 8 = Encourage forestry 9 = Collect statistics 10 = Other, specify……	LIST IN ORDER OF IMPORTANCE First ____ Second ____	

6	Are there any engine powered rice-husking machines in this village?	*1 = Yes* *2 = No*	1 2	
7	What agricultural practices are mostly used in this village? *Definition:*	*1 = Rotational* *2 = Pioneering*	1 2	
VIII. Wages, prices, restrictions and house construction				
1	How much is a farm worker paid per day currently …..	*For preparation of land?* *For harvesting?* *For other agricultural work?*	……KIP ……KIP ……KIP	
2	Which is paid best, agriculture or non-agricultural work?	*Non-Agricultural work is paid:* *1 = Much more* *2 = Little more* *3 = The same* *4 = Lower*	 1 2 3 4	
3	What is the current farm gate price for paddy glutinous rice?	*Lowland rice: Price per KG* *Upland rice: Price per KG*	……KIP ……KIP	
4	What is the current farm gate (paddy) price for ordinary rice?	*Price per KG*	……KIP	
5	What is the current price of white glutinous rice sold in village market?	*First quality* *Normal quality* *Low quality* *No local village market*	……KIP ……KIP ……KIP 1	
6	What is the current price of white glutinous rice sold in markets outside the village?	*First quality* *Normal quality* *Low quality*	……KIP ……KIP ……KIP	
No.	***Question***	***Alternative Answer***	***Answer code***	***Skip to***
7	What is the current price of white ordinary rice sold in village market?	*First quality* *Normal quality* *Low quality* *No local village market*	……KIP ……KIP ……KIP 1	
8	What is the current price of white ordinary rice sold in markets outside the village?	*First quality* *Normal quality* *Low quality*	……KIP ……KIP ……KIP	
9	Is there any non-agricultural employment available for people in this village?	*1 = Yes* *2 = No*	1 2	
10	What is the average daily wage for a labourer?	*Adult male:* *Adult female:*	……KIP ……KIP	
11	Is the wage for men and women for the same work different in this village?	*1 = Yes* *2 = No*	1 2	
12	Which are the main restrictions the people in this village are facing for not earning more money ? CIRCLE ALL ALTERNATIVES AVAILABLE	*1= Lack of jobs* *2= Lack of saving* *3= Lack of credits* *4= Lack of land* *5= Lack of seed* *6= Lack of irrigated* *7= Poor fertility of soil* *8= Unsafe soil* *9= Lack of store* *10 = Lack of knowledge* *11 = Lack of manpower* *12 = Lack of transports* *13 = Lack of market* *14 = Draught* *15 = Flooding* *16 = Insect*	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	