



Transport Costs and Prices in Lao PDR **Unlocking the Potential of an Idle Fleet** 2018



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Transport Costs and Prices in Lao PDR: **Unlocking the Potential of an Idle Fleet**

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Acronyms and Abbreviations

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
cbm	Cubic meter
COGS	Cost of goods sold
FC	Fixed costs
FEU	Forty Foot Equivalent Unit
FTL	Full truckload
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GMS	Greater Mekong Subregion
HGV	Heavy goods vehicle
ISIC	International Standard Industrial Classification of All Economic Activities
LIFFA	Lao international freight forwarders association
LTL	Less than truckload
MDTF	Multi Donor Trust Fund
NR	National road
SME	Small and medium enterprises
TEU	Twenty Foot Equivalent Unit
ton-km	Ton-kilometer
VAT	Value added tax
VC	Variable costs
VFC	Vehicle fixed costs
PDR	People's Democratic Republic
US\$	United States dollar

Exchange rates

USD 1 = LAK 8,200

THB 1 = LAK 265

CNY 1 = LAK 1,320

VND 1 = LAK 0.37



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Executive Summary

The cost of transport in Lao PDR is said to be higher than in neighboring countries, affecting the competitiveness of producers and shippers alike. However, the picture appears to be more nuanced. Since there has not been much hard evidence to support this claim, this paper fills the gap by empirically investigating transport costs and prices for domestic routes in Lao PDR and identifies the key drivers behind transport costs.

Operational performance of companies

The transport sector in Lao PDR can be described as thin, consisting of a dozen large players (defined as having a fleet size of more than 50 trucks) and many small firms (companies with less than 5 trucks or owner-operators). Many of the micro firms work in the informal sector. Productivity levels in the Lao transport sector are generally very low. Across the study sample, the average annual distance driven per truck is only 55,000 km which is very low, though comparable to other landlocked, developing countries.

Transport costs are on average LAK 489 per ton-km (equivalent to USD 0.06 per ton-km). A large majority of transport companies operate within a band of LAK 230 (USD 0.028) and LAK 575 (USD 0.07), of which variable costs make up 62 percent. Smaller firms tend to be less efficient than larger ones in spite of their much smaller overhead costs. The 25 percent cost advantage per ton-km of informal firms is offset by the economies of scale of larger firms that operate newer and larger trucks.

In order to determine transport prices, both transport operators and transport users were interviewed. Depending on whether the transport prices were based on the actual cargo size and weight or on the vehicle's capacity, transport

prices were LAK 2,966 (USD 0.36) or LAK 882 (USD 0.11), respectively.

Transport prices in Lao PDR are considered high as they are based on actual cargo weight. But high transport prices are largely observed in the less-than truckload segment. Transport prices vary considerably with the direction of transport, with lowest prices observed for Southern routes compared to Northern routes. It is striking that transport prices based on actual cargo weight are much higher than prices based on vehicle capacity. This implies that Lao transporters do not fully utilize their vehicle carrying capacity. Still, downsizing the vehicle fleet is unlikely to bring a cost-benefit to transporters, given the much higher per ton-km operating costs of smaller vehicles.

The underutilization of weight capacity in the transport sector could also be attributed to cargo generally being more voluminous than heavy in Lao PDR. Additionally, Lao transporters operate the trucks that are available to them rather than the ones most suitable to the task. Given Lao PDR's topography, not all vehicle types and sizes are ideal for all routes. Transporters tend to use larger vehicles on Southern routes with their flat terrain and smaller vehicles on Northern routes.

Contrasting transport costs against price data provided by transport operators shows several firms operating at a loss. On the other hand, when using price data from the transport users, the survey reveals high profit margins, especially in consumer goods distribution. This is partially because of small shipment sizes and weight. However, overall profits are likely overstated considering low vehicle utilization and large overcapacity in the sector. This is in part because

the model employed did not capture idle times of the fleet whereas in practice vehicle fixed costs (such as depreciation, vehicle financing, etc.) continue to accumulate. Overloading is one strategy firms use to increase productivity.

The low annual mileage, together with the high cost of capital and low profit margins, prevent companies from investing in more expensive, yet more cost-efficient vehicles, which in turn increases variable operating costs. Whereas management capacity in Lao PDR is low across all sectors at varying degrees, the large number of small firms with little operational capacity in the transport sector helps to explain why the operational standards in that sector are so low.

Market and competition

Many transport companies in Lao PDR deploy vehicles at the behest of the customer. While they are also covered by contracts, the relationship between the two parties is what holds the deal together, rather than market competition. This is because personal or family relationships play a large role in the business culture in Lao PDR. As a result, operators do not appear willing or able to redirect their activities, compete for work, and break into new routes and markets. And while no operator would admit to being part of a cartel or operating in collusion on a particular route, none of them is keen to compete beyond their main routes. The result is a highly fragmented trucking sector along territorial lines. This is exemplified by large per-ton-km price differences between routes across the country. But there are also large differences in prices observed even along similar or overlapping routes, such as Vientiane – Luang Prabang (LAK 3,671) vs. Vientiane – Luang Namtha/Boten (LAK 1,394). While some of the price difference may be attributed to the small sample size for specific routes, more relevant explanations may include factors such as the probability of getting a return load and competition by foreign operators. Transport firms may be willing to accept a lower

transport price outbound if they have a high chance of getting a return load on the way back. The chance of getting a return load from Luang Prabang is much lower than getting one from Boten, hence prices are considerably higher.

The Boten route is also one of the few examples where the impact of foreign competition on domestic transport prices can be observed. Prices for domestically transported goods (Vientiane – Luang Prabang) have not been affected yet because foreign transporters are not allowed to carry domestic loads, per cabotage rules. However, with Chinese vehicles allowed to source and deliver cargo to final destination based on a bilateral agreement, Lao operators are increasingly exposed to foreign competition for international cargo. The vast majority of cargo destined to Boten is international cargo (imports from China or exports to China).

This is good news for Lao consumers. Importers and exporters already benefit from lower prices for international cargo. Export competitiveness of Lao products increases as the final price of Lao products delivered abroad decreases.

Regional opportunities

Lao operators need to modernize and enhance utilization of their trucking fleets. The Vientiane – Boten route provides a showcase for how market liberalization policies and international competition can contribute to reduced domestic transport prices. Given the current market situation, the direct delivery of Thai and Chinese trucks to their destination within Lao PDR (rather than transshipping at the border onto a Lao truck) has reduced transport prices. Whereas this is beneficial for consumers, it has also led to considerably less work for domestic operators. The absence of a robust domestic demand for transport, current overcapacity and low vehicle utilization (on average 55,000 km per year) may trigger a mass exodus of Lao firms from the

transport sector, unless Lao operators are able to acquire significant volumes of international cargo. However, competing in this market will require investments in newer, more fuel-efficient vehicles, which in turn would require an annual mileage of at least 75,000 km.

Lao transporters should exploit more opportunities in regional markets. Lao transporters can provide an interesting value proposition with considerable business opportunities if they start embracing international movements rather than protecting their market. From a regulatory perspective, Lao PDR transporters enjoy more freedom than any other country within the Greater Mekong Subregion, given existing bilateral agreements with all neighboring countries. By engaging in regional trade, Lao operators could offer transport services across the entire region without unnecessary and costly transshipments (provided they are increasing their standards of operation too). This opportunity still exists, but the window is closing with the growing logistics capacity in Vietnam and Thailand.

It is also important to build the capabilities of Lao trucking operators. Most Lao operators do not seem interested in competing in the wider GMS and ASEAN regions and have not developed the skills to market their abilities or respond to enquiries in a professional manner. The study team has encountered a strong desire from SME managers and owners to receive training in marketing and management, and to enhance their understanding of accounting principles, all of which is key in pursuing international opportunities.

Access to port traffic at Laem Chabang and Bangkok can help reduce the empty running that is prevalent in the Lao transport markets. A key aspect of tapping into regional trade opportunities is access to Laem Chabang and Bangkok ports, as the majority of international trade transits through these ports. Currently, very few trucks can access the ports because of transit bond issues. The share of Lao containers is only 60,000 out of the 7 million annually.





1 > Background



The World Bank has undertaken a broad study -- Commercialization of Rice and Vegetables Value Chains in Lao PDR : Status and Prospects (World Bank, 2018) -- to better understand the current and potential role of the private sector in agricultural production, distribution, onward processing, and export competitiveness to identify policy reforms. As part of this effort, the World Bank looked in detail at transport operators' costs and the transport prices borne by consumers. Transport costs and the quality of logistics services play a key role in the ability of firms in Lao PDR to connect to regional and global value chains, to import inputs and to ship final goods to destination markets. High transport costs directly undermine the competitiveness of the Lao private sector. There have long been assertions that the cost of transport in Lao PDR is higher than that of its neighbors, affecting competitiveness of producers and shippers alike. At the same time, there has not been much hard evidence to support those claims. This paper fills this gap by empirically investigating transport costs and prices for domestic routes in Lao PDR and identifies the key drivers behind transport costs.

Several studies on the transport sector have already been completed. Many of them, such as Private Sector Views on Road Transport along the North South Economic Corridor (Ksoll & Quarmby, 2012), have focused on trade and transport facilitation measures, and how to better integrate the regional transport market, often in relation to the GMS economic corridors.

Another set of studies looked at the international linkages of the Lao transport sector. For example,

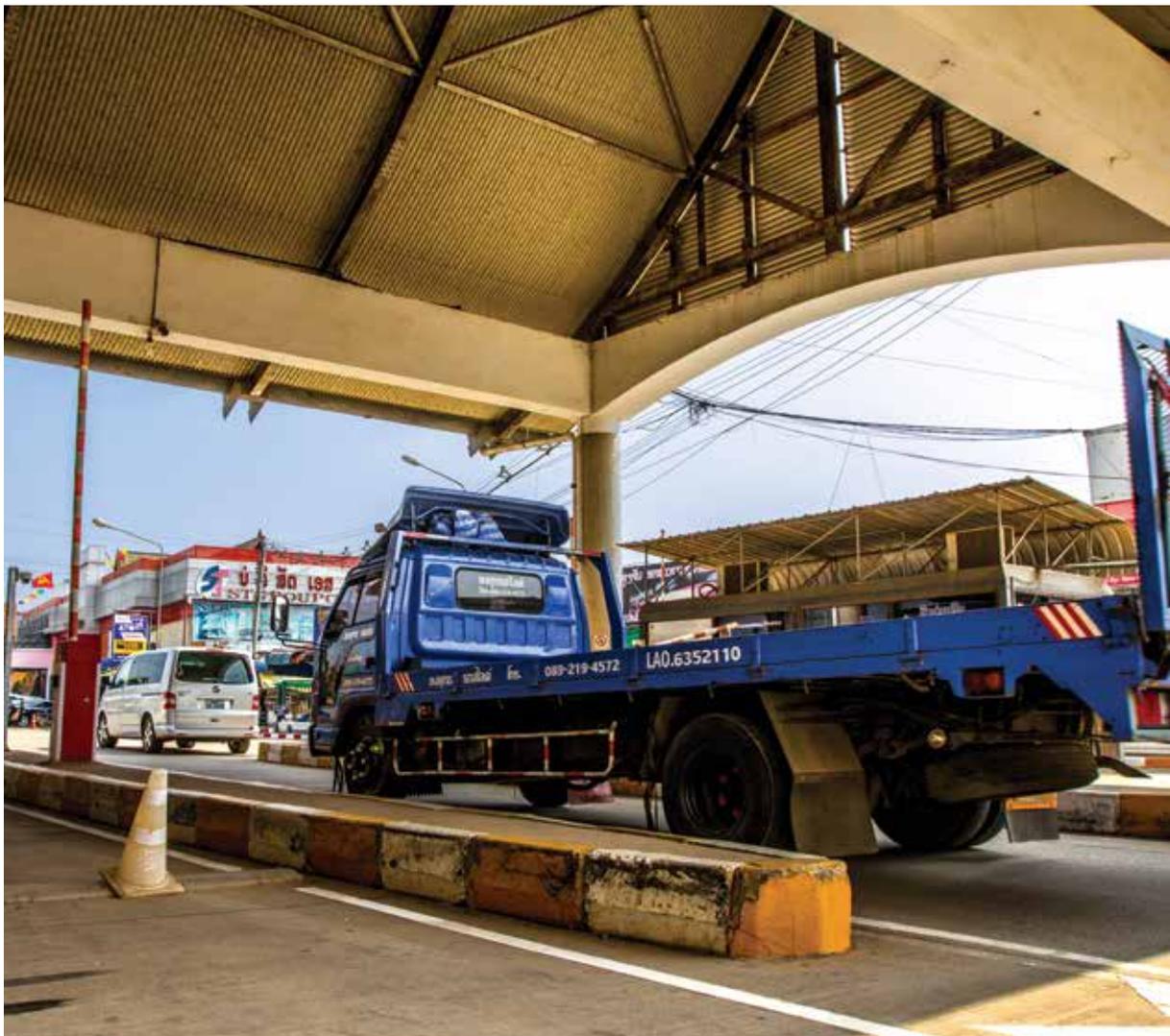
GIZ conducted the study Transport and Logistics in Lao PDR: Impact of the ASEAN Economic Community (Apthorp, Ksoll, & Quarmby, 2014), which aimed to estimate the impact of a more open ASEAN market on the Lao transport sector. The authors predicted that competition in the transport and logistics sectors from foreign vehicles would intensify with the greater market liberalization of ASEAN countries. More foreign firms would offer services in Lao PDR and would outcompete Lao operators. The study also shows that there are ample business opportunities for the Lao transport sector, including internationally. Development of the sector means not only greater participation of Lao vehicles in import, export, and transit traffic, but also the introduction of value-added services, such as door-to-door cold-chains for the handling of perishable agricultural products in the Lao export and Thai-Chinese transit trades. Lao transporters have one and only one choice if they want to remain in the business: upgrade, innovate, and compete.

Very few studies are based on hard transport and logistics cost data, although some studies attempted to gather such information. Most notable are two studies focusing on international transport: Lao PDR - Trade and Transport Facilitation Assessment (World Bank, 2014) and Logistics Benchmark Study of the East West Economic Corridor (Banomyong, 2010). The trade and transport facilitation assessment focuses on the corridors connecting Bangkok with Lao PDR's three main entry ports, namely Vientiane, Kaysone Phomvihane and Chong Mek/Pakse. The logistics benchmark study estimates transit time and costs across the entire East West corridor, from Tak in Myanmar to Danang in Vietnam, a

distance of 1,110 km. The average transit time is between 37 and 70 hours, and the average costs are approximately USD 1,800. However, it should be noted that at the time of study, there were essentially no cargo movements along the entire corridor. Costs and timeframes have been estimated with the assistance of logistics service providers. Whereas the study provided information on border crossing delays and costs – including an estimate of informal fees – there is no information on the domestic components of each corridor section.

The most recent work on logistics costs in Lao PDR was financed by IDE-JETRO (2017). This firm-level survey investigates international transport costs from Japan to Lao PDR. The paper studied both international as well as domestic transport costs in Lao PDR and Thailand, and concluded that transport costs in Lao PDR are between 1.4 and 2.2 times higher than in Thailand, depending on whether a backload cargo was secured.

To fully understand the Lao transport sector, more information is needed. This study aims to fill this gap by investigating the costs and prices along several domestic transport routes in Lao PDR.





2 > Scope and methodology



The following section provides an overview of the scope, methodology and approach used to determine transport operating costs and prevailing transport prices.

> Scope

The focus of this study is on the domestic transport sector and transport services carried out by heavy goods vehicles (HGVs). For this study, HGVs are defined as trucks with a gross vehicle weight in excess of 9.5 tons. The study explores prevailing transport costs and prices in detail. It is recognized that bus services provide an alternative transport option on some routes, which is treated as competition to HGV transport.

Lao PDR is a landlocked country and the smallest one among its neighbors in terms of economic size. Given that transport firms from neighboring countries operate in Lao PDR, transport policies in other countries affect the Lao domestic transport sector. To the extent relevant, this is highlighted in this report.

> Methodology

This study aims to provide detailed insights into transport operating costs and transport prices for end-users on specific routes. The study is therefore split into two corresponding sections. The interviewers used a detailed questionnaire capturing the different cost and price components for both parts of the study.

Cost component of the study

To determine transport costs, transport service providers were surveyed through face-to-face interviews. The costs are further disaggregated into three broad categories (further explanation on the different variables is available in Annex I):

i) Fixed costs (FC)

Also referred to as overhead. For the purpose of this study, typical costs included regulatory compliance costs (licenses, permits, etc.), annual insurances (for cargo, building, etc.)¹, staff costs for management and administration, maintenance workshops, warehouses (if directly related to the transport operations) and drivers. It also included facility related costs (i.e. rent, electricity, communication expenses, company cars, etc.), as well as external loans.

ii) Vehicle fixed costs (VFC)

Vehicle fixed costs are all costs incurred to ensure vehicles are ready for use. This consists of three main components: capital costs for vehicle financing, regulatory compliance costs (registration, insurance, technical inspection, road tax, and in some cases an operating license for the truck), and depreciation of the vehicle.

iii) Variable costs (VC),

Variable costs include all components associated with the operation of the vehicle.

According to enterprise registration data (Ministry of Industry and Commerce Lao PDR, 2018) there are a total of 11,894 companies involved in road

¹ Excluding insurance for vehicles.

freight transport in the entire country. However, this number is grossly overestimated as the registry does not delete entries. The enterprise data proved not to be very useful.

Due to time and resource constraints, a total of 27 cost interviews were conducted, for a total of 33 route observations (see Table 1). The selection of the firms was based on several lists of transport companies available to the study team. The selection of companies on that list was random. Since many lists were out of date, the actual selection of transport companies was based on firms still in operation that were available and willing to participate in the study. The interviews were carried out in two different locations -- Vientiane and Pakse -- but interviewees came from a variety of locations across the country (including Oudomxay, Luang Prabang and Savannakhet among others).

Price component of the study

To assess transport prices in Lao PDR, the study team interviewed transport users, which were selected using two approaches:

Selection via company registry data: some companies were identified based on a number of “transport-heavy” ISIC codes from the business registration data of the Ministry of Industry and Commerce in Lao PDR. This provided an initial pool of 2,248 companies. The selection for price interviews used a random approach but was balanced between company size (determined by registered capital), sectors, activity and location. Targeting companies using the company registry data was not very effective because (i) the initial selection contained many inactive firms and unsuitable companies, and (ii) not all companies selected agreed to be interviewed or disclosed the information requested, in spite of assurances of confidentiality.

Selection through the network of the study team: as a second step a number of companies were identified through the network of the study team to complement the initial selection from the company registry.

In the end, 64 companies were surveyed on transport prices for a total of 84 route observations (see Table 2). The interviews for transport prices were conducted in person and by phone using a

Table 1 > Sampling data for transport costs

	Total
Entire road transport industry population (Ministry of Industry and Commerce Lao PDR, 2018)	11,894
Companies on various lists*	300
Companies approached	77
Companies interviewed	31
Interviews used in the survey	27

Source: (Ministry of Industry and Commerce Lao PDR, 2018), Authors

Note: * Includes companies that ceased operations.

Table 2 > Sampling data for transport prices

	Total
Companies by selected ISIC codes (Ministry of Industry and Commerce Lao PDR, 2018)	2,248
Companies shortlisted	87
Companies interviewed	64

Source: (Ministry of Industry and Commerce Lao PDR, 2018), Authors.

structured questionnaire. The interview lasted approximately 15-25 minutes and surveyed inbound and outbound transport, although not every company provided data for both legs.

As part of the transport cost interviews, transport prices for the routes surveyed were also collected to obtain an initial picture of profitability. These prices were later validated anonymously by the study team who requested quotes for the same or similar routes.

Assumptions

In order to analyze transport costs and prices in Lao PDR, the study team built a detailed price and cost model. A major challenge was to capture the different business models found in the marketplace to reflect actual transport costs. This was particularly difficult for firms with mixed business models. For example, some manufacturing companies also maintain their own fleet, and the transport function is only part of the company to support their main business activity. To the extent possible, the study team attempted to separate transport costs from other business activities.

Additionally, a number of assumptions were made in order to appropriately reflect costs in the model (i.e. if respondents did not take certain cost components into account or did not know the costs). This was particularly true for vehicle financing and depreciation. A detailed explanation of the assumptions and calculation of costs is provided in Annex I.

Other assumptions were made in order to meaningfully combine the different cost components because of the different basis for calculation. For example, variable costs are calculated for a specific trip (with specified distance and duration), company fixed costs had to be broken down for the entire year and the kilometers driven throughout the year in the

company. Vehicle fixed costs were a mix between costs accruing throughout the year and the distance driven by a particular truck per year.

› Limitations

The study team was well received by the transport companies interviewed. Generally, companies shared their information, even competition-sensitive data. Nevertheless, it is suspected that not all companies were fully transparent, as the data in some cases did not correspond with the team's on-site observations. One company has been excluded from the final analysis because of data credibility issues.

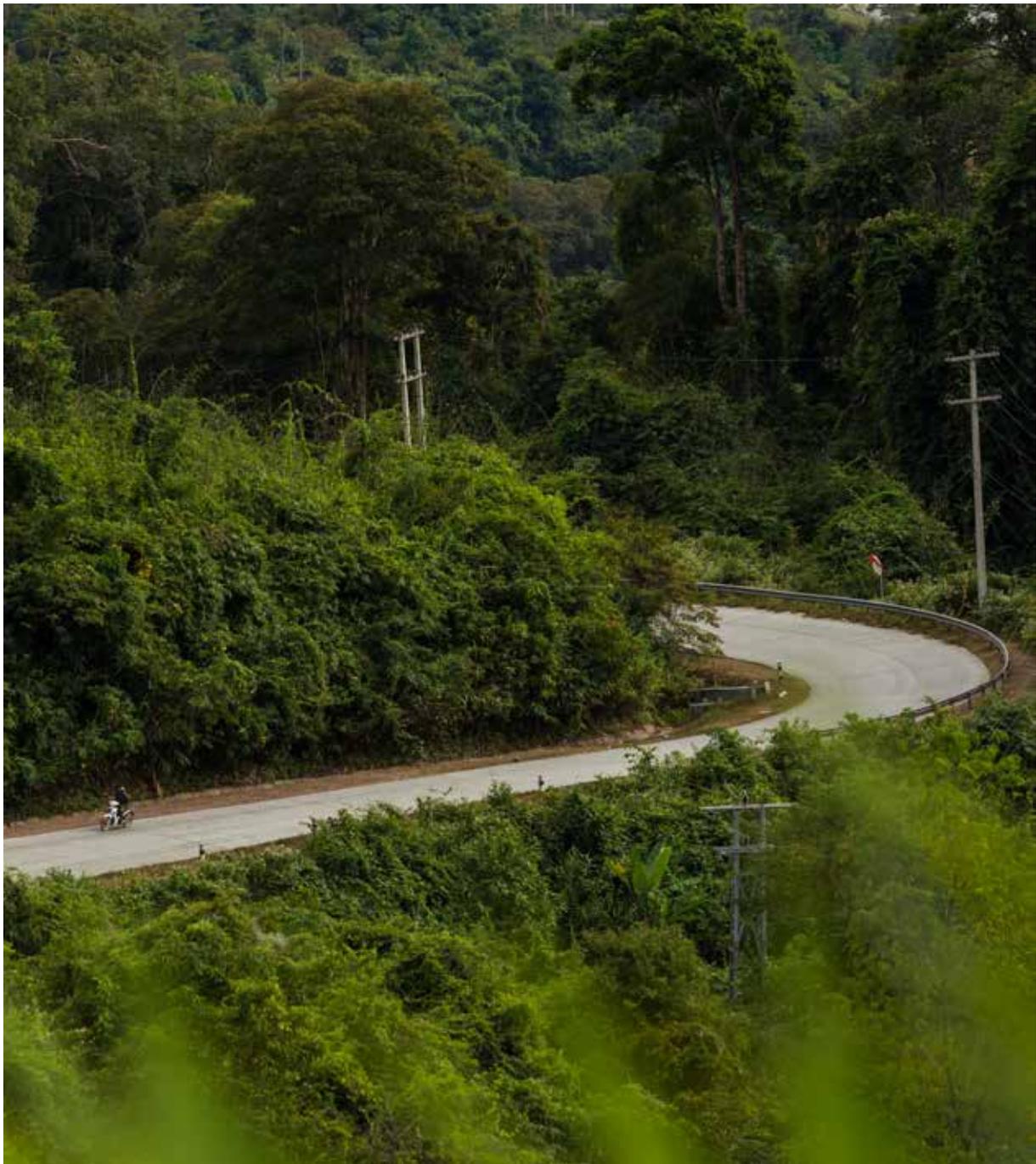
The level of professionalism within companies varied widely. Larger companies maintain accounting departments to track costs and revenues. Newer players, usually with younger management, used computers. Traditional family-owned businesses with up to 20 trucks or so often tracked their expenses in handwritten notebooks. The study team had the impression that none of the companies maintained very detailed records. And when it came to the question of taxes, there was little incentive to be transparent. Where no detailed record was available, numbers were estimated during the interview.

Generally, the structured interviews proved suitable to collect transport cost information. However, since the transport costs interviews were very time consuming, the study team aimed only for a limited number of observations. More data on costs could have been collected but the study team made a decision based on the inevitable trade-off between quality and quantity.

The study team encountered difficulties in finding companies willing to provide data on transport prices in Lao PDR. As a consequence, data for some routes is thin, and when stratified, sometimes comprises of only a few or even single

observations. It was difficult to derive meaningful conclusions because of the large variations in the data. At the same time, interviews (in-person or by phone) continue to be the best instrument to

collect such data. Given the overall reluctance to share price information, any other method would have most likely resulted in even fewer responses.





3 > Findings and Results

> Transport market

Macroeconomic perspective

Cargo volumes within Lao PDR are generally low, especially when compared to neighboring economies (China, Thailand, Vietnam, Myanmar). Very few sectors or companies generate significant cargo volumes for domestic transport. The largest ones for domestic distribution are beverages (BeerLao), natural resources (various mines), construction materials (i.e. cement factories) and a few others. The common theme identified through interviews with operators is that there is considerable idle transport capacity. The downturn in business can be attributed to a number of factors:

- Foreign trucks being able to deliver directly to destination and the related reduction in cross-border transshipment.
- Greater use of foreign trucks for exports as return cargo (see above point).
- The continued use of inadequate transport equipment by Lao operators; most import cargo arrives on semi-trailers while the majority of Lao transporters still use 12-wheeler trucks.
- A fall in many commodity prices and their knock-on effect on domestic transport demand.
- Greater enforcement of anti-logging legislation, especially in the Champasack province.

- New market entrants, facilitated by significantly cheaper trucks from China and, more recently, greater availability of second-hand trucks from Japan.

The impact of the above is felt both in the international and domestic transport market. International transport by Lao trucks suffered a steep decline due to liberalization policies. Lao operators were not prepared to compete with neighboring countries nor did they establish direct business links with Thai, Vietnamese or Chinese firms. Lao operators continue to prefer the border transshipment model which has been promoted by LIFFA and parts of the Lao government (see Box 5). The lack of articulation (semi-trailer) operations also reduces the scope of work that the Lao operators are able to assume cost-effectively. In the domestic segment, new market entrants split the domestic pie in a greater number of smaller pieces, largely incentivized by the availability of cheaper trucks. At the company level, the picture is mixed as some of the larger companies, mostly with longer-term contracts, have not felt the slowing demand as much as smaller ones.

Importers and exporters in Lao PDR have benefitted from the liberalization policies of the government. Foreign transport companies are providing better transport services at lower prices. Exporters can access foreign markets more cheaply and Lao PDR's trade competitiveness has improved. But the effects of greater competition in the international transport segment has not trickled down to the domestic market. Prices on purely domestic routes are still higher, likely because foreign trucks are prohibited from carrying domestic cargo due to cabotage rules.

Regulatory environment

In order to transport goods in Lao PDR as a third party service provider, a transport license must be obtained from the Ministry of Public Works and Transport². The license entitles the holder to provide third-party transport services in the entire country. In certain sectors, a transport license can also be obtained for transport of own cargo. While own-account operators are not supposed to offer third party transport services, they often do and can as long as the customer does not require a VAT receipt.

The licensing process itself is not perceived by transport operators as a barrier to enter the transport market. It is usually much more challenging to finance the purchase of vehicles at reasonable costs or find well-trained drivers.

To operate a vehicle, transport operators must obtain the following documents:

- Registration (renewal every 2-5 years)
- Third-party liability insurance (annual renewal)
- Technical inspection (annual renewal)
- Road tax certificate (annual renewal)
- “Truck passport” (annual renewal; for international operations only)

The costs of obtaining all licenses are around LAK 2-5 million per truck per year, depending on truck size and insurance coverage.

Domestic market segments

The following section provides an overview of the different market segments as well as an overview of the most commonly used vehicles within those segments:

- **General hauliers:** These are operators without any specialization that operate in the open (spot) market. They usually work on shipment-by-shipment contracts as well as take second-hand work or operate under the control of a consolidator. For the latter, they fill in the gaps during periods of high demand from primary contractors. These firms tend to be SMEs and are particularly vulnerable to demand shocks.
- **Contract operators:** They are often general hauliers but have long-term contracts with some of the major transport users (beverages, animal feed, cement, construction material, agricultural products, etc.). In order to land one of these contracts, the companies must meet a number of requirements in terms of safety, accounting standards, vehicle quality, experience, etc. As a result, these operators generally perform at a higher level across all areas of operation. In some cases, the contracts stipulate geographical limitations.
- **Specialist carriers:** Specialist carriers are often required to use special equipment to fulfill transport demand such as cement carriers, fuel tankers, ore and mineral trailers. They tend to work on dedicated contracts as they can't use their equipment in the general market. Whereas investment costs are much higher, these carriers are somewhat protected from new market entrants given the long-term nature of their contracts. Specialist carriers tend to get higher returns that reflect the higher investment costs. Nevertheless, these operators must know their cost base well to ensure a return on investment.
- **Mineral / raw material transporters:** These companies generally have higher equipment standards and purchase new equipment from Japan, China or Europe during times of high mineral prices and resulting high transport demand. Although many firms are

² The Ministry of Industry and Commerce issues the business license, the Ministry of Public Works and Transport issues the transport license.

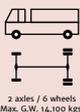
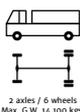
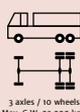
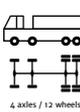
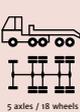
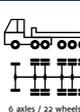
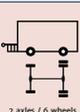
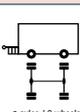
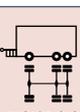
now suffering from the price downturn, they seem better prepared to handle it, with less borrowing and a better understanding of their true cost structure. Some have also been able to diversify to new revenue sources.

- **Own account operators:** Own account operators maintain their own trucking fleet to support their main business activities. In Lao PDR, typical cases are fuel distributors, saw mills, cement producers, and others. They are somewhat similar to specialist operators in terms of requiring special equipment, and hence the need for major capital investments. Unlike specialist operators, they do not carry for hire and reward for other companies. Since most of those companies are part of larger companies they tend to follow accounting principles (including depreciation and accrual for maintenance costs). A key difference with third party transport services is that own account operators treat transport operations solely as a cost of doing business and do not tend to transfer it to the cost of goods sold (COGS).
- **Mixed own account and general haulage:** In some cases, own account operators offer transport services on the open market, although they may have only a general business license for a manufacturing or trading activity. The boundaries between transport and other activities is often blurred.
- **Consolidators:** These are groupage or Less than Truck Load (LTL) operators that offer transport services along a particular route. They rely on a main customer base and generally charge by weight and/or volume (kilo/ton, cubic meter). In most cases they maintain warehouses at both points of origin and destination to hold cargo. For return cargo, they rely on their own customers as well as compete on the open market. They generally use second-hand Japanese 12-wheelers, and their costing tends to be wholly based on round trips.
- **Owner-operators:** Owner-operators often operate in the informal sector. Business operations are often financially not viable with interest rates in excess of 5 percent per month. Their overhead costs are typically limited to a small storage area for an operating base. The trucks are for hire at various truck gates around the county. In many cases, they operate on specific routes with a fixed customer base. Since they operate in the informal economy, there are no official records, all payments are made in cash, and taxes, if any, are paid as a lump sum. Without accounting practices, depreciation is not taken into account. All expenses are financed out of pocket, and if expenses exceed affordability, the operator exits the market. Among this group, there is generally little respect for laws and regulations, and overloading is common practice.
- **Agricultural traders and producers:** Agricultural traders as well as producers often maintain their own trucks, generally very few in numbers (1-3 vehicles) and size, to bring the produce from the farm or collection point to the local market. Growers bring their produce to collection points where they get paid for the amount delivered. Traders take it from the collection point to local or even national market. While growers use vehicles as small as vans and pick-up trucks, 6-,10- or 12-wheeler trucks and/or buses are used for longer distances. There is no evidence that these vehicles or their operation are costed in any way other than as the cost of doing business. The cost of transport is not factored into the selling price – this is determined by the market, and traders ensure they are not losing money.

Box > 1


Common trucks used in Lao PDR

There are only a few different truck types being used in the transport sector in Lao PDR. The most common ones have been listed in the table below. Southeast Asian countries (especially Thailand and Lao PDR) make reference to specific types of trucks by classifying the number of wheels instead of carrying capacity or gross vehicle weight. The table below provides a reference for “conversion”. It should be noted that trailers are combined to tractor-trailer configurations as well as rigid vehicles commonly referred to as wagon and drag.

Truck type	Gross vehicle weight	Estimated carrying capacity	Common name and usage
 2 axles / 6 wheels Max. G.W. 14,100 kgs.	9.5 tons	1 to 6 tons	4-wheeler Urban distribution
 2 axles / 6 wheels Max. G.W. 14,100 kgs.	14.1 tons This is the max. There are smaller ones	2 to 7.6 tons	6-wheeler Urban distribution and refrigerated box trucks
 3 axles / 10 wheels Max. G.W. 23,200 kgs.	23.2 tons	13.2	10-wheeler Heavy cargo in distribution, construction or agriculture
 4 axles / 12 wheels Max. G.W. 27,200 kgs.	27.2 tons	15.2 tons	12-wheeler Mainstay of national fleet (second-hand from Japan where they are known as 10 tonners)
 5 axles / 18 wheels Max. G.W. 41,400 kgs.	41.4 tons	25.4 tons	18-wheeler Semi-trailer with 6x4 tractor and 2-axle trailer
 6 axles / 22 wheels Max. G.W. 49,600 kgs.	49.6 tons	30.6 tons	22-wheeler Mainstay of long-distance and container movements. 6x4 tractor and tri-axle trailer
 2 axles / 6 wheels Max. G.W. 16,100 kgs.	16.1 tons	9.1 tons	6-wheeled trailer on 2 axles Used with 10 or 12 wheeled rigid as a draw bar outfit
 2 axles / 8 wheels Max. G.W. 18,200 kgs.	18.2 tons	11.2 tons	8-wheeled trailer on 2 axles Used with 10- or 12-wheeled rigid as a drawbar for vey heavy bulk cargo
 3 axles / 12 wheels Max. G.W. 27,300 kgs.	27.3 tons	17.3 tons	12 wheeled trailer Used with 10- or 12-wheeled rigid as a drawbar for very heavy bulk raw materials

Source: Authors.

Domestic transport sector

The trucking sector is highly fragmented with a dozen large players (with a fleet size in excess of 50 trucks). The majority are small firms (with less than 5 trucks) or owner-operators, many of which work in the informal sector. The market itself is very thin with many companies specializing in one type of operation or operating on one particular route. Management capacity and service levels are generally low, and the Lao trucking fleet can be characterized by an aging fleet of second-hand Japanese 12-wheelers that have been converted from left-hand to right-hand driving.

In addition to trucking operators, there is also an extensive bus network in Lao PDR. Bus services are commonly used for both passengers and smaller freight shipments. Buses operate between all major cities in Lao PDR with Vientiane being the lynchpin. Vientiane is connected to all major towns in the country, often with several departures a day. The bus companies also carry unaccompanied cargo on a 'port to port' basis and there is no collection or delivery. Buses do not capture a large part of freight transport demand but are very popular for time-sensitive shipments of 100 kg or less. They enjoy a good reputation for operating on time and being an effective way to send smaller cargo to regional centers on a same day or overnight basis. The bus station to bus station service is used by many shippers in Vientiane to supply customers in rural Lao PDR. It is slightly more expensive than using consolidation services, but it is faster as buses follow a schedule and don't wait to be fully loaded to depart. Payment for transport services is either in advance or upon collection of the goods.

Box > 2



Using bus services for freight transportation

Agricultural traders from Champasack reported using bus services to send cabbage and other vegetables to Vientiane. They use this service unless they have enough cargo to fill an entire truckload.

The price to send a 20 kg bag is LAK 10,000. Traders deliver normal shipments of 20-30 bags to the bus station in Pakse. The cargo is picked up in Vientiane where it is directly transferred to the nightly wholesale market for resale.

It is also possible to send a "full bus-load" of 400 bags. In this case, the bus company sends a dedicated bus to deliver the cargo directly to the market in Vientiane. The price for this service is approximately LAK 4 million, which is roughly comparable to the cost of a 6-wheeler truck.

The use of buses to carry full loads of cargo is not restricted to agriculture. Full busloads of charcoal bags can be seen being offloaded at Lao Bao on the Vietnamese border too.

Source: Interviews.

Transport network and route specialization

Domestic transport network

Lao PDR can be roughly divided into two broad geographical areas, the South and North, with inherently different terrain and topography. As can be seen in Figure 1, the southern part of the country is largely flat and features better roads. The northern part is hilly and mountainous with windy roads and tight curves. Wear and tear on the infrastructure is much heavier in the North because of climatic conditions.

Figure 1 > Topographical map of Lao PDR



The main domestic transport corridor is NR 13 which runs all the way from Boten at the Chinese border to Nong Nokkien at the Cambodian border. Most economic centers of the country are located along the corridor including Vientiane, Thakhek, Savannakhet, Pakse, Luang Prabang, and Luang Namtha. Most other main routes, especially East-West routes such as NR8, NR12, NR9 are used for international traffic to and from Thailand and Vietnam or link the various mines, hydropower and infrastructure projects and agricultural areas with markets.

Route specialization

Although Lao is a small country, the trucking industry is territorially fragmented. This is in part because of existing customer relationships and investments in infrastructure such as warehouses and sales offices. In addition, there seems to be some territorial segregation of the transport market amongst operators. While no operator would admit to being part of a cartel or operating in collusion on a particular route, none of them is keen to compete beyond their main routes. Even large, national companies do not operate in all parts of Lao PDR. This is particularly the case for consolidation services that tend to specialize on certain routes, such as Vientiane – Luang Prabang. The rates are higher than those to Luang Namtha. However, no operators to the other districts had plans to compete on the Luang Prabang route even though they pass through it when going North. Even freelancing informal operators are hesitant to take on work outside their regular route. A combination of personal and commercial relationships seems to keep outside operators from gaining a foothold. For transport users, this translates to generally higher prices for transport than they would face under free market competition.

› Vehicle utilization in comparison

Among the companies interviewed, the average annual distance driven is 55,000 kilometers. In comparison with other developing countries (see Figure 2), Lao PDR is in the lower mid-range and is comparable to other developing, landlocked countries (i.e. Niger, Malawi, Ethiopia, Hungary, Czech Republic, etc.).

The low annual mileage together with the high costs of capital and low profit margins prevent companies from investing in more expensive, yet more cost-efficient vehicles. This in turn increases variable operating costs and prevents them from competing with transport service providers from neighboring countries. This is exacerbated by the grim outlook for the transport industry. In recent years, declining transport demand together with new market entrants have led to significant overcapacity in the sector. As a result, many trucks remain idle for long periods of time.

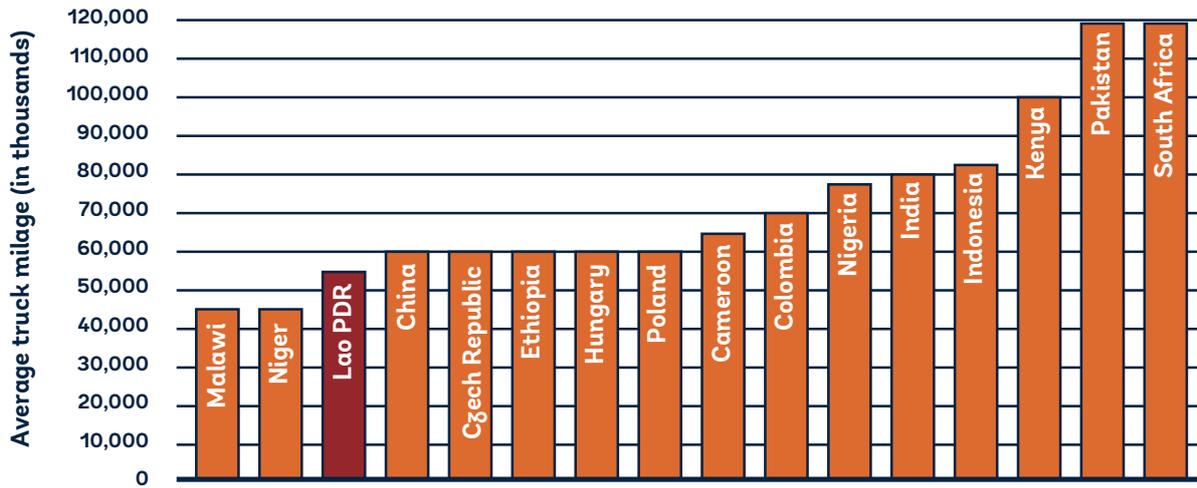
Costs, prices and profitability

This chapter presents the findings obtained from the data gathered in the transport operator and user surveys relating to costs, prices and profitability.

Transport costs

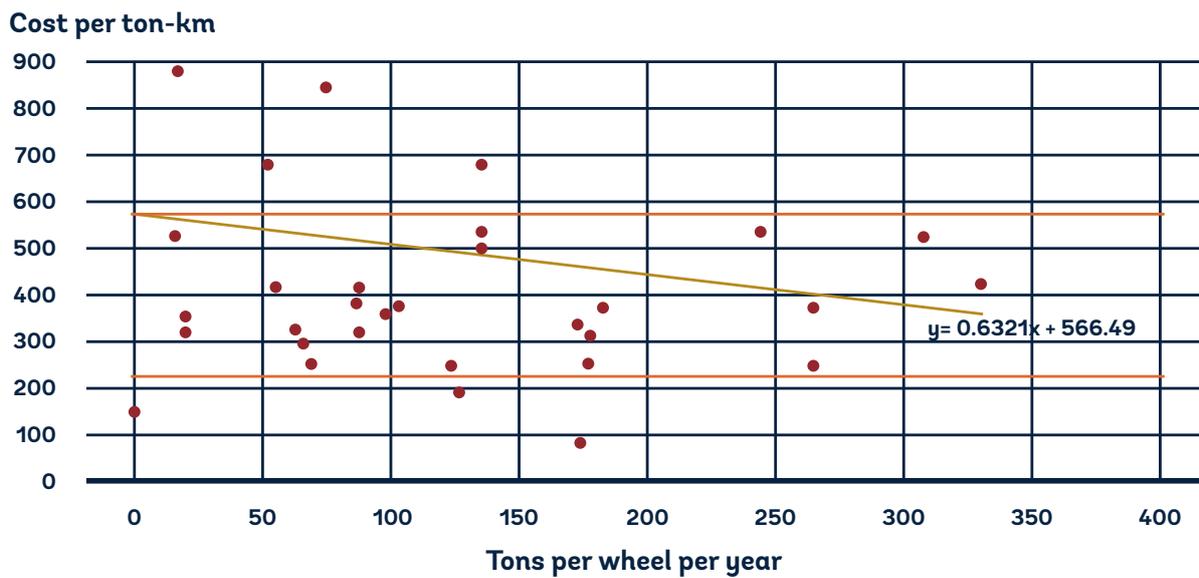
The average transport costs per ton-km within the entire sample is LAK 489 (USD 0.059). When eliminating two peculiar outliers (with costs in excess of LAK 1,800), the average operating costs per ton-km decrease to LAK 454 (USD 0.049). As can be seen in Figure 3, the large majority (>70 percent) of companies operate within a band of LAK 230 (USD 0.028) and LAK 575 (USD 0.07). Total costs per ton-km decrease with increasing economies of scale. The greater the utilization of vehicles (measured as tons per wheel per year), the lower the total cost base per ton-km.

Figure 2 > Average truck mileage in selected developing countries in 2007



Source: Adapted from (Teravaninthorn & Raballand, 2009)

Figure 3 > Total cost per ton-km by cargo carried per wheel per year (all observations)



Source: Authors

Note: Red lines indicate corridor between LAK 230 and 575.

Overhead costs

Overhead costs are dominated by staff costs, in spite of a generally low average wage. On average, company staff and management account for two thirds of the overhead costs. External financing costs make up around a quarter of the overhead costs – general company loans account for 14 percent and costs for fleet financing account for 10 percent.³ Within the sample, overhead costs vary substantially. As expected, these are very small for informal transport operators, whose main overhead consists of a small storage area to store goods temporarily and who usually operate with less than 3 trucks.

In order to finance working capital, companies tap various sources: commercial banks, friends and family, as well as external investors. Capital costs for loans are generally expensive but vary greatly. Banks tend to offer the cheapest rates, but not all companies have access to them. Within the sample, interest rates varied from as low as 8 percent per year to as much as 5 percent per month. Informal companies tend to pay the highest interest rates, because without formal access to finance, they rely on family, friends and loan sharks. The duration of loans is usually in the range of one to five years.

Within staff expenses, drivers make up on average 50 percent of total staff costs. The wages for drivers and assistant drivers can usually be split in two parts: (i) a base wage, which amounts to LAK 16.8 million (USD 2,050) per year on average, and (ii) trip allowances. Trip allowances are calculated based on the duration of the trip and cover food, accommodation and, in some cases, small truck maintenance costs. In rare cases, drivers receive only a trip allowance without a base wage. The average trip allowance within the sample is LAK

182,000 per day. Trip allowances are an essential part of the drivers' remuneration and are used to complement their base salary. The more overnight trips drivers make the more trip allowances they get. The average costs for an employee across all ranks and across all firms amounts to LAK 19.5 million per year, and is therefore only slightly higher than the base wage for drivers per year.

Finding and retaining reliable and safe drivers is a key challenge across the entire industry. The problem of driver retention affects vehicle utilization as well as fuel usage. Operators do not hold drivers accountable to performance because the drivers are likely to walk away, and the costs to recruit new, better drivers are too high. Only few companies with newer equipment are starting to monitor driver performance, as other countries do, and hold drivers to higher standards. At the same time, one company reported that it is not offering more services because it is not able to find qualified drivers for its trucks.

Variable costs

Variable costs vary considerably depending on the distance, trip duration, terrain, road condition, and other factors. The key driver of variable costs are fuel expenses (on average 58 percent of variable costs), staff costs (17 percent) and tires (13 percent). See Figure 4 below for a breakdown of variable costs.

The average variable costs make up around 62 percent of the total costs per ton-km -- the remaining 38 percent of costs can be attributed to fixed costs⁴. This 60/40 ratio is similar in other regions such as East Africa; but compared to developed countries (for example, France where the ratio is 45/55), the share of variable costs is high. The difference can be largely attributed to

3 Cost for fleet financing have been added as a proxy to reflect higher capital costs for companies with a large trucking fleet. It should be noted that those costs are based on various assumptions and estimations by the authors and should therefore be used with caution.

4 A detailed explanation of the various cost types and what is included within each of them can be found in Annex I: Technical notes on the variables used in the models.

the much lower overhead costs, especially wages. The difference in financing costs is probably not significant when balancing between lower capital expenditure and much higher interest rates.

Using new and upgraded equipment reduces variable costs, but less than expected. New trucks (up to 3 years) are only around 8 percent cheaper to operate per kilometer than older trucks (see Table 3 i Variable costs by vehicle age and geographical area (LAK per kilometer)). This could be due to the fact that new Chinese trucks entering the market are less efficient than new trucks from Japanese or European manufacturers. This effect is most visible on northern routes where the terrain is very mountainous, most new trucks are Chinese and older trucks tend to be Japanese. Chinese long-haul trucks are usually 22-wheeler semitrailers, while Japanese vehicles are usually second-hand 12-wheeler rigid imports. Yet, operating costs are higher for new trucks than old ones. On southern routes, where the terrain is flat, new trucks seem to offer a 22 percent cost advantage.

Table 3 > Variable costs by vehicle age and geographical area (LAK per kilometer)

	Total	North	South
New truck	4,685	4,886	4,285
Old truck	5,053	4,792	5,532

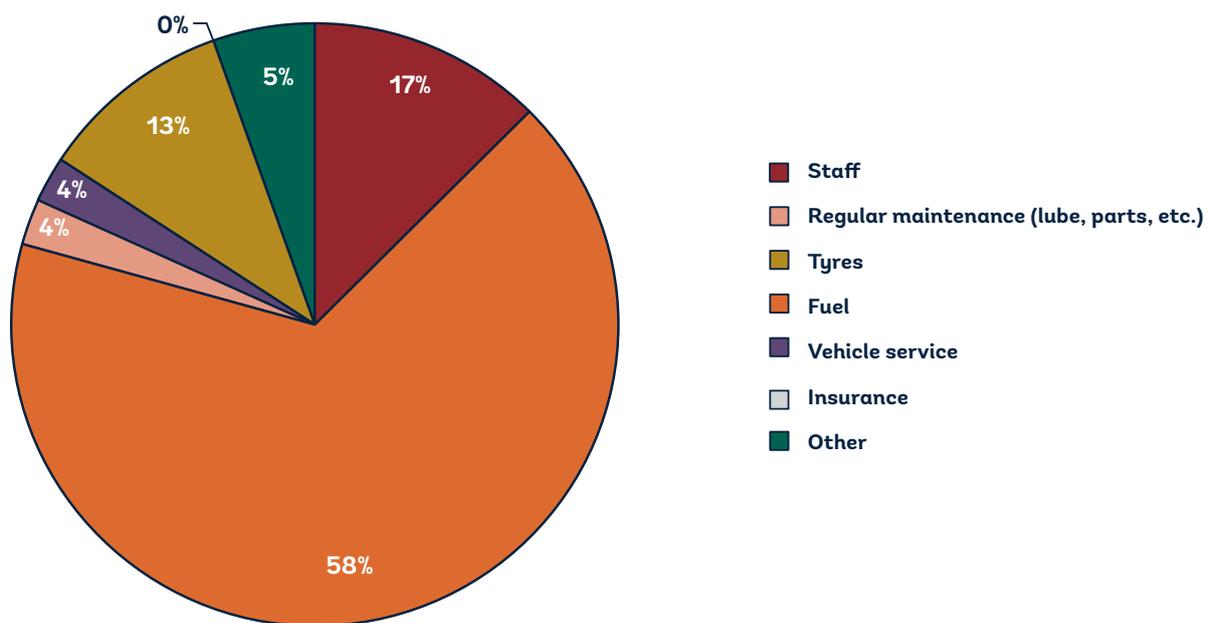
Source: Authors

Note: A new truck is defined as being 3 years or less; an old truck more than 3 years.

Vehicle fixed costs

Vehicle fixed costs include annual vehicle registration, financing costs and depreciation. Many Lao operators, especially micro and small companies, do not appropriately reflect depreciation costs in their pricing. As a result, companies often go out of business once the truck is in disrepair (or when repair costs are too high). Therefore, depreciation costs have been assumed in the model even though not all companies take them into account. Some larger companies do apply depreciation and basic accounting methods.

Figure 4 > Breakdown of variable costs



Source: Authors.

Across the sample, depreciation costs account for little more than half (52 percent) of the vehicle fixed costs. Vehicle finance costs make up a little less than half (45 percent). Vehicle registration costs account for a mere 3 percent.

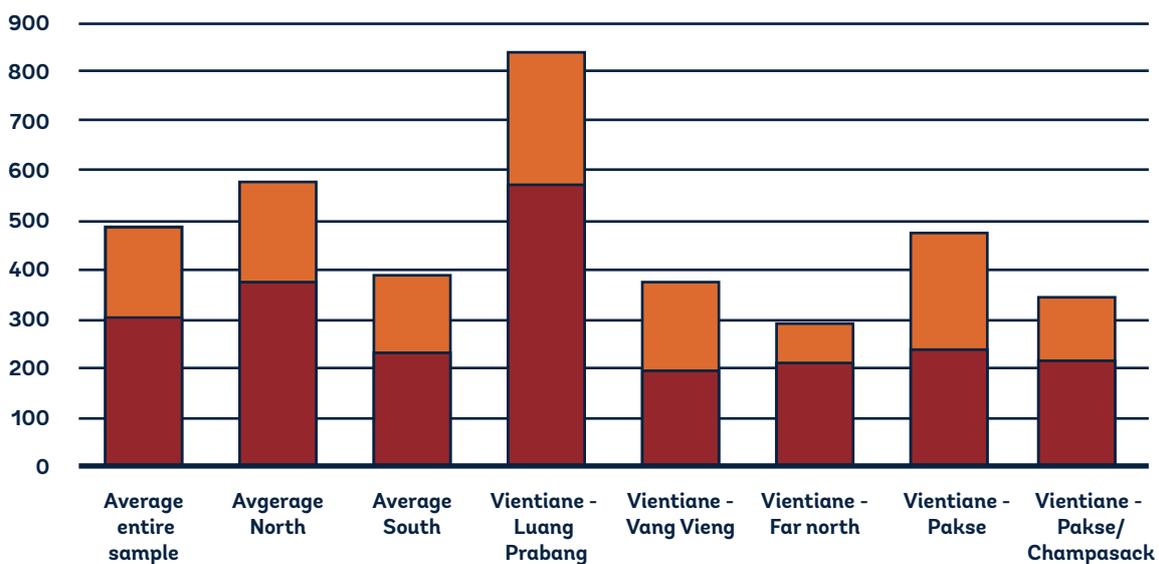
The cost of capital for vehicle financing are relatively expensive in Lao PDR with typical interest rates between 10-15 percent per year (usually over a period of 3 years). Companies minimize those costs by purchasing cheaper, second-hand vehicles as well as opting for upfront cash payments as opposed to external financing. In such a case, the capital cost assumed in the model were the deposit rates of the largest commercial bank, at 7 percent.

Transport costs by route

Given the inherent geographical differences between the northern and southern regions in Lao PDR and their likely effect on operating costs, the study investigated these costs between northern and southern routes.

Figure 5 shows that average total costs per ton-km are much higher for northern routes (LAK 582) than for southern routes (LAK 391). At first glance, it seems abnormal that the route to Luang Prabang is substantially more expensive than routes to the far north (including Boten, Luang Namtha and Huayxay) in spite of using the same infrastructure. There are a number of reasons for that: The service provision is very different between the far north route and Luang Prabang. The Luang Prabang route is dominated by consolidation services as it is a major consumption center. Consolidation services are far more expensive than regular full truck load transport services. Companies that provide consolidation services usually maintain a destination warehouse, plus daily laborers which help operate the acceptance facility and handle the loading and offloading of cargo. The higher share of fixed costs to total costs is a combination of the higher overhead as well as the shorter distance.

Figure 5 › Variable and total costs for selected routes (LAK per ton-km)



Source: Authors

Note: Far North includes Boten, Luang Namtha and Huayxay.

Box > 3


Comparing transport costs with the findings of other studies

As mentioned above, IDE-JETRO (2017) conducted a study on domestic transport costs in Lao PDR. This box compares the findings of this survey with the IDE-JETRO study.

The paper studied both international as well as domestic transport costs in Lao PDR and Thailand and concluded that transport costs in Lao PDR are between 1.4 and 2.2 times higher than in Thailand, depending on whether a backload cargo was secured. For transport costs, the picture is more mixed. Whereas fuel is generally more expensive in Lao PDR, driver wages are a quarter of those in Thailand. The prices of vehicles depends on the brand and origin – Japanese trucks are more expensive in Lao PDR, Chinese ones are cheaper. Generally, the domestic logistics costs in Lao PDR greatly varies with conditions of terrain, types of transportation equipment, freight forwarder’s nationality etc.

The following table provides a more detailed summary of the costs in the two studies:

Route	Average	Maximum	Minimum	Per KM	Study
Vientiane – Savannakhet (empty backload)	USD 1,208	USD 1,250	USD 1,100	USD 2.466	IDE-JETRO
Vientiane – Savannakhet (with return load)	USD 743	USD 750	USD 735	USD 1.515	IDE-JETRO
Vientiane – Savannakhet (empty backload)	USD 864	-	-	USD 0.915	This study
Vientiane – Luang Prabang (empty backload)	USD 1,510	USD 1,562	USD 1,375	-	IDE-JETRO
Vientiane – Luang Prabang (with return load)	USD 928	USD 938	USD 919	-	IDE-JETRO
Vientiane – Luang Prabang (empty backload)	USD 964	USD 1,172	USD 854	USD 1.162	This study

Note: Transport costs along the Vientiane - Luang Prabang route have been estimated in the IDE-JETRO study to be 1.25 times of those between Vientiane and Savannakhet.

Data on the Vientiane - Savannakhet route in this study is based on a single observation.

Data on the Vientiane - Luang Prabang route in this study is based on three observations. Only full truckloads have been included in order to maintain comparability.

The exchange rate used to convert LAK to USD is 1:800, the same that was used in the IDE- JETRO report, to ensure comparability.

As can be seen in the table above, the results of this study are slightly higher than the “with return load” costs but substantially lower than the “empty backload” ones. The differences could stem from the fact that both studies rely on very few observations. There is also some ambiguity in the IDE-JETRO study with regards to the exact routing and nationality of the service providers.

Source: Authors, IDE-JETRO (2017)

Transport costs by firm size

Within the sample, large companies (and to some extent medium size firms) tend to be more efficient than their smaller competitors. They tend to drive more kilometers per year than others and, despite their overhead costs, have lower per ton-km costs (see Table 4) In part, this could be explained by the fact that most of the larger companies have long-term contracts with one of the major transport service users. Large contracts provide certainty on cargo volumes and prices, even if it may also require specialized transport equipment that cannot be used otherwise. While this seems to limit investments in new equipment (the average age of trucks at large companies is 5.6 years) it also seems to encourage investments in larger equipment (large companies operate on average the largest truck). Owner-operators are on the opposite of the spectrum. They drive the least number of kilometers per year, operate the smallest vehicles and their costs per ton-km are double the ones of large companies.

Although the sector is facing large overcapacity, mostly in medium and small companies, no major shifts in market share seems to be taking place. Larger companies operating under longer-term contracts seem to be “too busy” to venture out to new routes and gain market share from their less competitive rivals. This may be attributed to the fact that each transport operator is bound to family or commercial relationships as well as the territorial organization of the Lao transport industry where each operator has its own market place (see also section on Contracts and price setting) -- although no evidence could be found to substantiate this claim.

Transport costs by formality

The study team interviewed only a small number of firms in the informal sector. All of them were owner-operators with the exception of one with 3 trucks operated by other family members.

Formal companies face a 25 percent higher total cost basis per kilometer, in spite of operating much larger vehicles. This can be explained by the higher overhead costs of formal entities, since the variable costs per kilometer are about the same (LAK 5,419 vs. LAK 5,426). In other words, the economies of scale of operating large trucks are approximately as large as the benefits of operating smaller vehicles in an informal setting. This also means that bringing informal companies into the formal economy may be difficult as they would lose competitiveness from increased overhead costs.

On a per ton-km basis, informal companies operate at 46 percent higher total costs even though their load factor is an estimated 4 percent higher than for their formal competitors (see Table 5). This indicates that formal companies use much larger vehicles and drive longer distances to reap economies of scale. This is somewhat reflected in the higher average annual kilometers driven (56,958 km vs. 48,233 km).

Transport prices

Table 6 provides an overview of transport prices by geographic location and selected domestic routes. The data was obtained from the transport prices survey. The data shown in the table distinguishes between prices charged based on actual cargo size and prices charged for the vehicle capacity (using full truck load shipments only). The concept is similar to chartering a bus for a tour group. For the bus operator, it does not matter much if there are 25 or 50 people traveling on the tour. But the price per person will double if only 25 show up. Applying this methodology to cargo, the price of transporting a shipment based on actual cargo size is broken down by the actual cargo weight (i.e. 5 tons), whereas in the case of vehicle capacity, the price of the shipment is broken down by the entire vehicle capacity (i.e. 15 tons). Only full truckload (FTL) shipments have been included in the analysis, to exclude price distortions from

Table 4 > Total cost per ton-km (overall, northern and southern routes)

Size of Company*	Overall	Northern	Southern	Annual Km	Avg. truck size**	Avg. truck age***
Large (5)	323	372 (3)	250 (2)	84,000	12.0	5.6
Medium (21)	452	524 (10)	387 (11)	54,325	10.3	5.7
Small (2)	328	- (0)	328 (2)	60,000	11.0	7.5
Micro (5)	862	866 (4)	845 (1)	38,680	9.2	6.8

Source: Authors

Notes: * By number of trucks (Large: >51; Medium: 6-50; Small: 2-5; Micro: 1)

** By average number of wheels per truck

*** In number of years

In parentheses: number of observations the results rely on.

Table 5 > Comparison of various performance indicators between formal and informal firms

Size of Company*	Overall	Northern
Average total costs per ton-km	425	776
Average total costs per km	9,532	7,068
Average variable cost per km	5,419	5,426
Average load factor vs. capacity	55 percent	59 percent
Average profits per ton-km (percentage)	4 percent	21 percent
Average annual km driven	56,958	48,233
Average truck age	5.8 years	7.0 years

Source: Authors

Note: Parentheses indicate the number of observations the results rely on.

Table 6 > Overview of transport prices by geographic location and actual prices (by weight and volume vs. vehicle weight and volume capacity (in LAK per ton-km))

	Km	No of observations (1)	Avg. price per ton-km (1)	No of observations (2)	Avg. price per ton-km (2)
Average all routes		85	2,966	62	882
Average North		40	3,336	40	869
Vientiane - Luang Namtha	650	2	1,394	1	521
Vientiane - Luang Prabang	362	12	3,671	8	552
Vientiane - Xiengkhuang	335	11	4,818	9	570
Xayaburi - Vientiane	400	2	563	2	759
Xayaburi - Luang Prabang	120	5	1,822	4	1,917
Average South		34	1,925	34	622
Vientiane - Champasack	671	7	1,479	5	528
Pakse/Champasack - Vientiane	740	3	943	1	353
Vientiane - Savannakhet	460	6	4,381	5	386
Savannakhet - Vientiane	460	3	419	-	-
Vientiane - Thakhek	430	2	4,826	1	228
Thakhek - Vientiane	420	3	1,191	3	934
Average Central	-	11	5,057	11	1,548
Vientiane - Bolikhamxai	150	2	2,492	2	687
Inner-city Vientiane	24	8	4,571	6	1,781

Source: Authors

Note: Average price per ton-km (1): based on actual cargo weight Average price per ton-km (2): based on vehicle weight capacity Km is average distance

consolidation services (which are usually much higher than FTL shipments).

Transport prices vary greatly by the direction of transport (both in (1) and (2)). Lowest transport prices are observed on southern routes with an average of LAK 1,925 / LAK 622 per ton-km, followed by northern routes with an average of LAK 3,321 / LAK 869. The highest prices per ton-km are observed on central routes with an average of 5,057 / LAK 1,548.

There are a number of explanations for this:

- The higher price of northern routes is likely due to the more mountainous topography and worse road condition (compared to southern routes).
- The high prices of central routes are driven by Vientiane inner-city movements in the sample. Prices for inner-city movements are highest because of the short average distances within the city limits. When excluding inner-Vientiane, the average transport price for central routes decreases to less than half, an average of LAK 2,492 / LAK 687.

There are large differences in observed prices even along the same routes (see prices in column 4 of Table 6 -- Avg. price per ton-km). For example, ton-km prices for Vientiane – Luang Prabang (LAK 3,671) are roughly 2.5 times higher than for Vientiane – Luang Namtha (LAK 1,394) in spite of being located along the same route with similar conditions. Similarly, the transport price for Vientiane – Champasack (LAK 1,479) is only one third of the price between Vientiane – Savannakhet (LAK 4,381) or Vientiane – Thakhek (LAK 4,826).

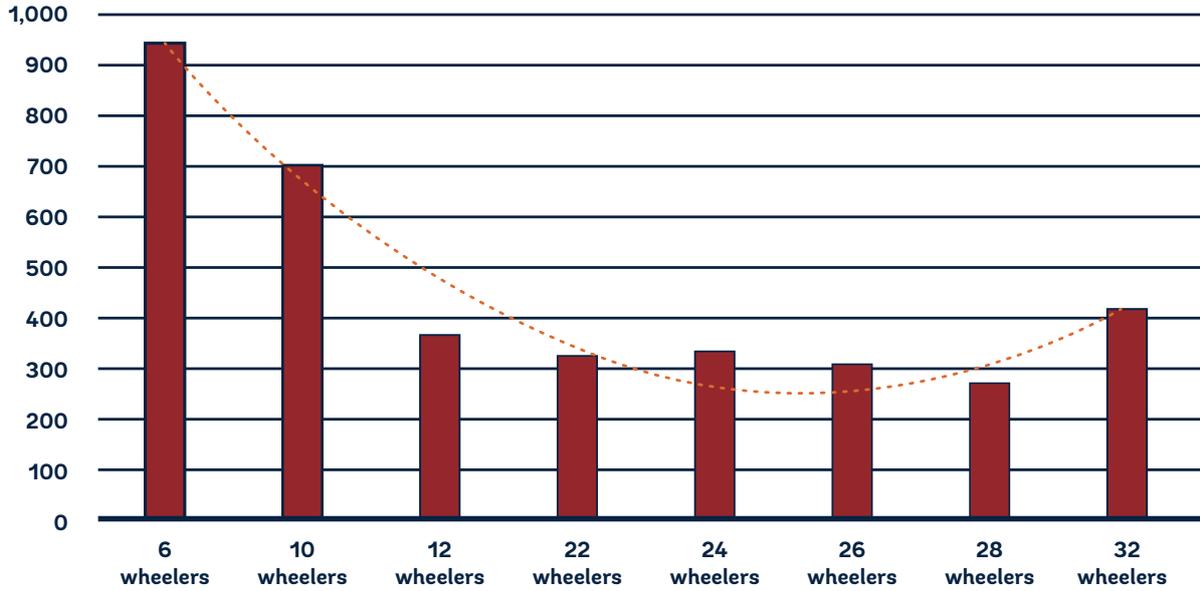
While some of this may be attributed to the small sample size for specific routes, more relevant explanations may be the probability of getting a return load, competition by foreign operators, as well as territorial fragmentation of the transport market (see also section on Transport market).

Transport firms may be willing to accept a lower outbound transport price if they have a high chance of getting a return load at or near their destination (i.e. from Boten). The chance of getting a return load from Luang Prabang is much lower so prices are considerably higher. Most trucks drive back empty due to the high trade imbalance between Vientiane and Luang Prabang, with the latter mainly sourcing consumer goods from Vientiane with little cargo to return with. On the other hand, trade between Vientiane and Luang Namtha is more balanced as there are many imports coming into Lao PDR from China via Boten, just 50 km North of Luang Namtha. The chance of landing a return load in Boten is higher, resulting in lower per ton-km prices.

The Boten route is also one of the few examples where the impact of foreign competition on domestic transport prices can be observed⁵. Transport prices for the domestic leg (i.e. Vientiane to Boten) are much lower than they are for other destinations along the same route (i.e. Vientiane – Luang Prabang). Prices for domestically transported goods have not been affected yet because foreign transporters are not allowed to carry domestic loads thanks to cabotage rules. However, with Chinese vehicles allowed to source and deliver cargo to final destination based on a bilateral agreement, Lao operators are increasingly exposed to foreign competition for international cargo. In fact, the vast majority of cargo destined to Boten is international cargo (imports from China or exports to China).

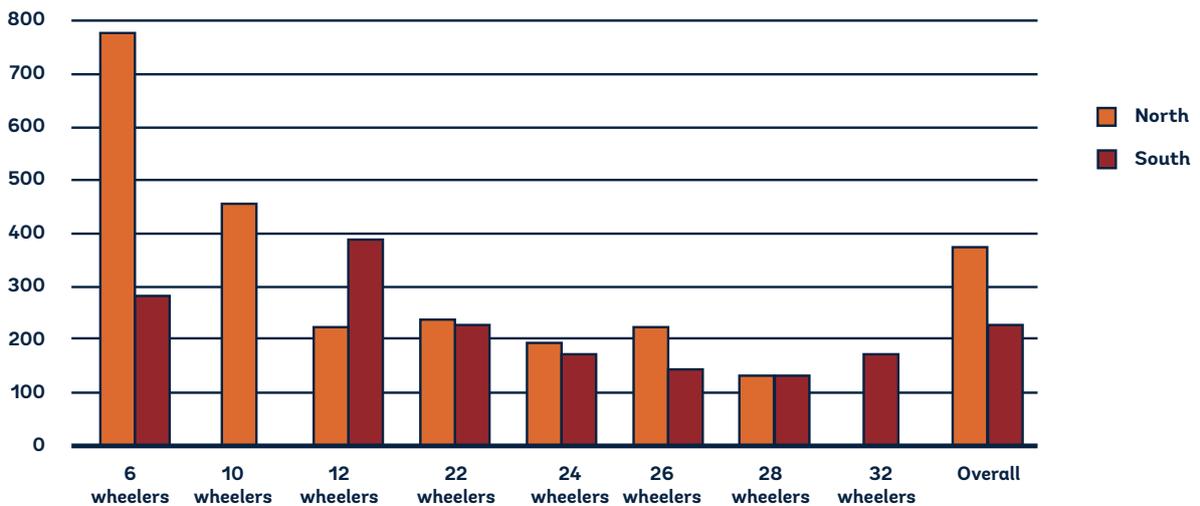
⁵ No price or cost data has been collected as part of this study for international transport as it focuses only on domestic transport (see also Scope section).

Figure 6 > Operating costs (LAK per ton-km) by vehicle size



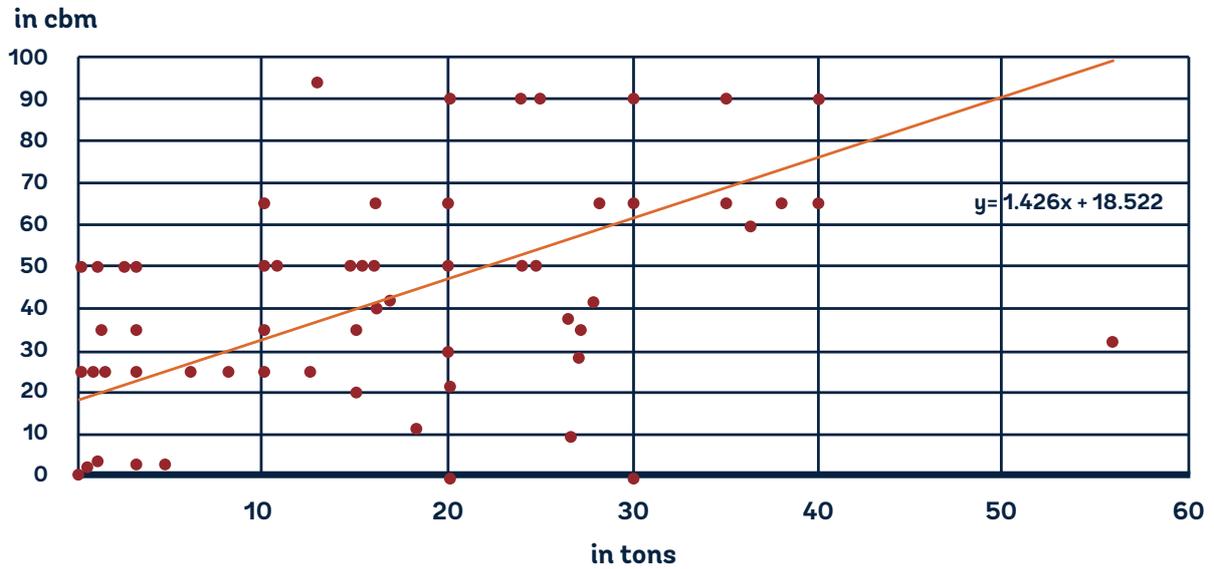
Source: Authors.

Figure 7 > Variable costs (LAK per ton-km) by vehicle size and route direction



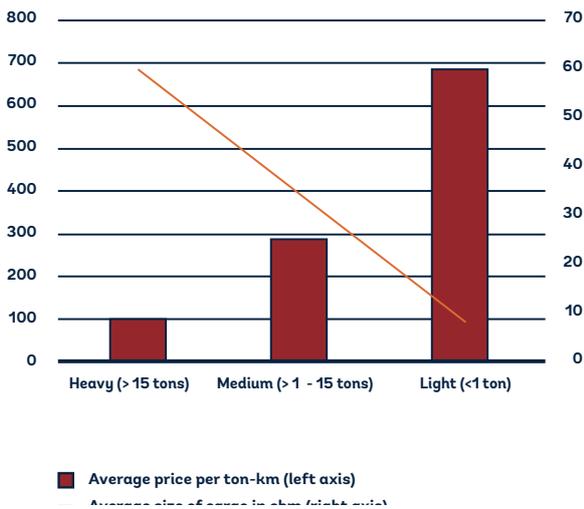
Source: Authors.

Figure 8 > Volume vs. weight (cargo density of Lao freight)



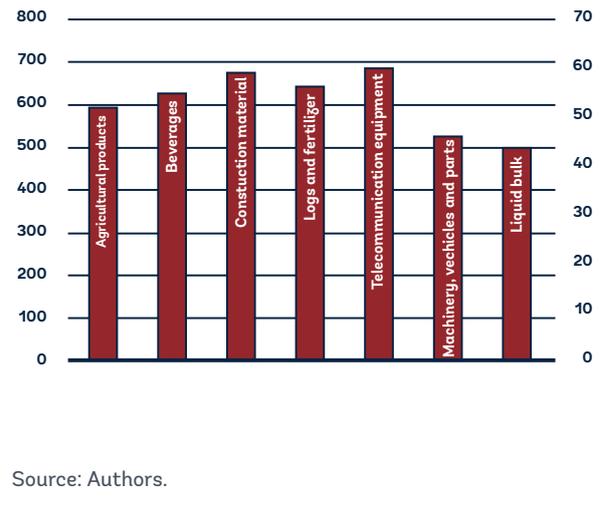
Source: Authors.

Figure 9 > Average transport prices by cargo weight (in LAK per ton-km)



Source: Authors.

Figure 10 > Transport price by product group (in LAK per ton-km)



Source: Authors.

Notes: Data only takes into account product groups with a minimum of 2 observations.
 Price data is based on vehicle capacity.
 Data does not include shipment transported below 150 km or cargo below 5 tons.

In spite of excluding consolidation shipments, it is striking that transport prices based on actual cargo weight are much higher than prices based on vehicle capacity. This implies that Lao transporters do not fully utilize their vehicle carrying capacity. However, as indicated in Figure 6, downsizing the vehicle fleet is unlikely to bring a cost-benefit to transporters, given the much higher per ton-km operating costs of smaller vehicles.

Economies of scale

Vehicle size determines operating costs. Total operating costs increase with the size of the vehicle, but larger vehicles, if fully loaded, have greater economies of scale and reduce operating costs per cargo unit. Figure 6 illustrates the economies of scale achieved for the different vehicle sizes in Lao PDR. It is worth noting that most economies of scale are achieved between 6-wheelers, 10-wheelers and 12-wheelers. The data suggests that there are little benefits of using trucks larger than 12-wheelers, in terms of cost per ton-km. While the heavy-use of 12-wheelers can be largely explained by their availability in the market (largely as imports from Japan), the benefits of investing in larger vehicles (including new ones from China) do not offer economies of scale. It is also important to note that the majority of semi-trailers (i.e. 22-wheelers) are Chinese imports which are less efficient than trucks from other manufacturers.

Additionally, given Lao PDR's topography, not all vehicle types and sizes are equally suitable for the different routes. Transporters tend to use larger vehicles on southern routes with their flat terrain and smaller vehicles on northern routes. Figure 7 illustrates the variable costs across different vehicle sizes by route direction. Whereas the data suggests the same narrative along northern routes as above, the economies of scale continue to increase for larger vehicles along southern routes, albeit at smaller increments.

Volume-weight considerations

The underutilization of weight capacity in the transport sector could also be attributed to cargo that is generally more voluminous than heavy in Lao PDR, as can be seen in Figure 8. Transporters may reach the volume capacity before they reach the weight capacity or axle load limits. For example, across the entire sample, the volume-weight ratio is on average 9.0 (for each cbm the weight is then 111 kg) while the international standard for road transport is 4.0 (cargo weights 250kg per cbm). However, it should be noted that natural resources are underrepresented in the sample.

Transport prices are inversely correlated with size and weight (see Figure 9). Prices increase steeply with decreasing cargo weight and size. For example, cargoes beyond 15 tons are shipped on average for LAK 979 per ton-km while prices for light cargo (below 1 ton) are on average LAK 6,911. Medium heavy cargo (between 1 and 15 tons) is priced on average at LAK 2,916. These stark differences are well-explained with economies of scale. The average size for light cargo is only 8.5 cbm, while for medium and heavy cargo it is 34.5 cbm and 60 cbm respectively.

Considering the trade-off between volume and transport costs of individual vehicle types, domestic transporters seem to have found an equilibrium.

Transport prices by product

Transport prices based on actual cargo weight vary greatly across the entire sample, from as low as LAK 52 to LAK 37,878. Using data on vehicle capacity, this range narrows down to LAK 36 to LAK 3,086. The following section presents some price data stratified by product groups and transport services using vehicle capacity data⁶.

⁶ To get a better sense of actual (long haul) transport prices in Lao PDR, cargo transported over very short distances (below 150 km) has been eliminated as well as very light and small cargo because this is often shipped by bus or one of the consolidators.

Transport prices seem to be somewhat uniform (in the range of LAK 527 to LAK 688) and independent of the actual product, with the exception of liquid bulk cargo (see Figure 10). The much lower prices for liquid bulk (LAK 499 per ton-km) can be explained by large economies of scale as transport volumes are relatively high throughout the year and distances on average fairly long. Additionally, since contracts are usually over longer periods of time (5 years), operators can depreciate their assets over a sufficiently long duration that it does not affect transport prices. The transport prices for beverages are relatively low because of the return loads of empty bottles.

Profitability of the Lao transport sector

Profits in different service and product segments

Contrasting transport costs against price data from the price survey reveals extremely high profit margins in the transport sector across all product groups with the exception of liquid bulk (see Figure 11). Consumer goods distribution commands extremely high prices, in part because of the small shipment size and weight, as well as the higher cost of maintaining cargo acceptance at destination facilities. This business provides the highest profits in absolute terms and gross margins of close to 50 percent. Gross profits seem to be particularly high in the agricultural sector although this is based on very few observations and not considered realistic.

Generally, this data should be taken with caution for a variety of reasons:

- Data for various products is extremely thin and relies on very few observations, especially cost data
- The cost data only considers trips when trucks operate. However, many trucks stand idle for long periods of time due to overcapacity in the sector. As a result, trucking operators

generally make very few profitable trips while their fixed costs accumulate, even when trucks are idle. Therefore the profits in the model are overestimated (see also section on Profits and vehicle utilization).

Cost and price by route

Costs and prices can differ significantly for different routes. Table 7 contrasts the cost of transport for various routes (based on the transport cost survey) as well as the prices from the transport price survey. Prices have been calculated based on actual cargo size and weight (1) and entire vehicle capacity (2). The latter only takes into account full truck loads.

Using prices based on actual cargo weight, it seems that profit margins may have not captured all price elements. The gap between costs and prices diminishes considerably once prices are calculated based on vehicle capacity rather than actual cargo size. Average profits across all observations decrease to 24 percent. This suggests that full truck load prices are generally calculated on a roundtrip basis. It also means that the premium for consolidation services is very high which may be in part driven by the challenge to fully utilize weight limits in consolidation cargo.

The high prices which are based on actual cargo weight explain why there is a general belief that transport prices in Lao PDR are high. However, high transport prices are largely only observed in the less-than-truckload segment where the average per ton-km price is LAK 7,191. If considering only full truckloads, transport prices decrease considerably (see column 4 in Table 7 -- Average price per ton-km (2)). On high volume routes (such as Vientiane - Luang Prabang, Vientiane - Savannakhet, Vientiane - Champasack/Pakse and a few others), one can observe very competitive rates in the range of LAK 228 to LAK 552 per ton-km. These also tend to be routes where larger trucks with lower operating costs are being used.

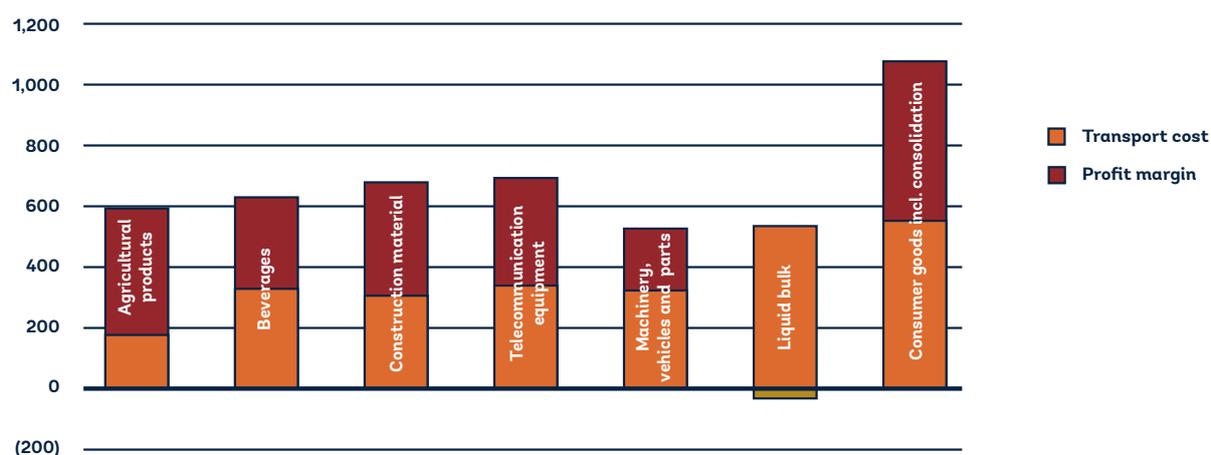
Table 7 > Costs vs. prices (in LAK per ton -km)

	Average costs per ton-km	Average price per ton-km (1)	Average price per ton-km (2)
Average all routes	489	2,966	882
Average North	578	3,321	869
Vientiane – Boten/Huayxay/Luang Namtha	294	1,394	521
Vientiane - Luang Prabang	839	3,671	552
Vientiane - Xiengkhuang	578	4,818	570
Xayaburi - Vientiane	-	563	759
Xayaburi - Luang Prabang		1,822	1,917
Average South	391	1,925	622
Vientiane – Champasack	347	1,479	528
Pakse/Champasack – Vientiane	-	943	353
Vientiane - Savannakhet	327	4,381	386
Savannakhet - Vientiane	327	419	-
Vientiane - Thakhek	-	4,826	228
Thakhek - Vientiane	-	1,191	934
Average Central	-	5,057	1,548
Vientiane – Bolikhamxai	-	2,492	687
Inner-city Vientiane	-	4,571	1,781

Source: Authors

Note: Average price per ton-km (1): based on actual cargo size and weight

Average price per ton-km (2): based on vehicle capacity (size and weight). This column only considers full truck loads (FTL shipments).

Figure 11 > Profits by service offering/product group


Source: Authors.

Note: Data only takes into account product groups with a minimum of 2 observations. Liquid bulk based only on 1 cost observation.

Price data is based on vehicle capacity.

Data does not include shipment transported below 100 km or cargo below 5 tons.

Prices vs. prices

The study team also collected prices directly from transport service providers. These prices are substantially lower than those that were provided by transport service users through the price survey. Due to the large differences observed, a handful of companies were approached anonymously to provide quotations for a transport service (identical or similar to the one surveyed during the cost interviews). While those quotations were on average 16 percent higher than the information provided during the interview, fuel costs had increased 17 percent since then, or LAK 1,250 per liter of diesel (Lao State Fuel Company, 2018). Variable cost increases seem to be passed on directly to the users.

Using the truckers data, the majority of firms within the sample seem to generate profits⁷, as can be seen in Figure 12. But profit margins within the sample vary substantially, with some companies recording margins in excess of 50 percent while others record losses of more than 70 percent per trip⁸. The average profit margin is 6.9 percent.

Variables such as routes served, company size, vehicle size, own account operators/long-term contractors/spot markets etc. are all insufficient to explain why companies generate profits or losses.

Profits and vehicle utilization

The profits shown are likely to be overestimated. Table 7 shows the profit margins when trucks are actually operating. The model used ignores idle times of the fleet whereas in practice, vehicle fixed costs continue to accumulate even when vehicles are idle. Very few companies run all trucks the majority of the time. In several companies, more than half of the fleet is parked. Box 4 provides an example from the survey.

Figure 12 also shows that some trucking companies offer transport services below full cost. This data has been provided by the transport firms themselves and confirms that only very few transport companies know their true operating costs. There are a number of explanations for this:

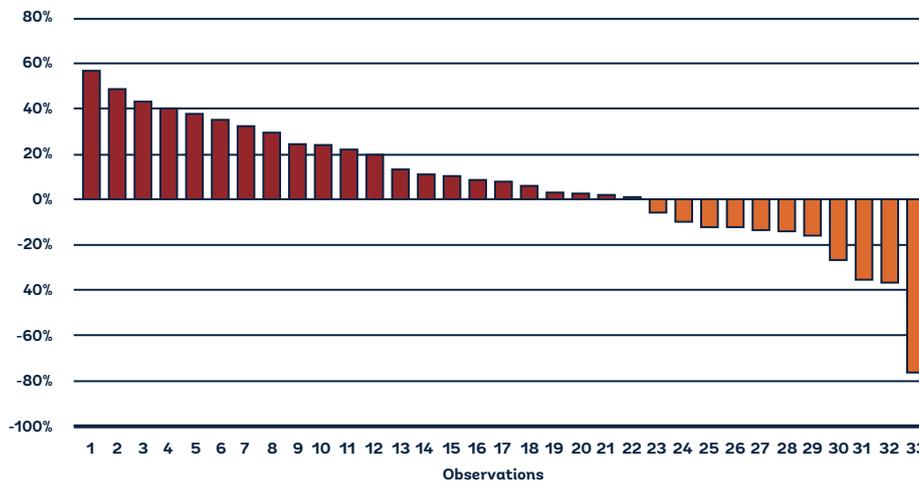
- The large majority of small transport firms operate on a “per trip” basis. They disregard depreciation, and financial obligations are only considered if and when an actual payment has to be made. Firms usually don’t consider opportunity costs. As a result, their overhead and fixed costs are very small and most costs are variable. This also explains the strong preference of transport firms to split their drivers’ pay into a small monthly fixed portion and a relatively large variable one. Without a base cost for the vehicle (i.e. financing costs and depreciation), the marginal costs for a truck to wait an extra day for a return load boil down to an extra day of allowance for the driver.
- Transport operations are not the primary business activity for all companies, in which case cross-subsidization occurs .
- Cost increases are passed on in the spot market through increased rates. In longer-term relationships, most rates are historical and well-established, and therefore more rigid. Additionally, they are often supported by ‘official rates’ from the local government and/or trucking associations⁹. However, small operators that attempt to discount the nominal tariff will come under pressure from their peers.

7 Profits are calculated based on prices and costs provided by the transport companies.

8 For that particular trip surveyed.

9 Officially these rates are for guidance only. These rates are determined based on distance and road condition/elevation criteria.

Figure 12 > Profit distribution (in percent) for all observations



Source: Authors.

Box > 4



Overstated profits

This example company has a fleet of 13 trucks. Its fleet consists of new and second-hand vehicles from Japan. Vehicle size varies between 12- and 22-wheelers. The company has been focusing on the spot market since it lost the long-term contract it had been operating under.

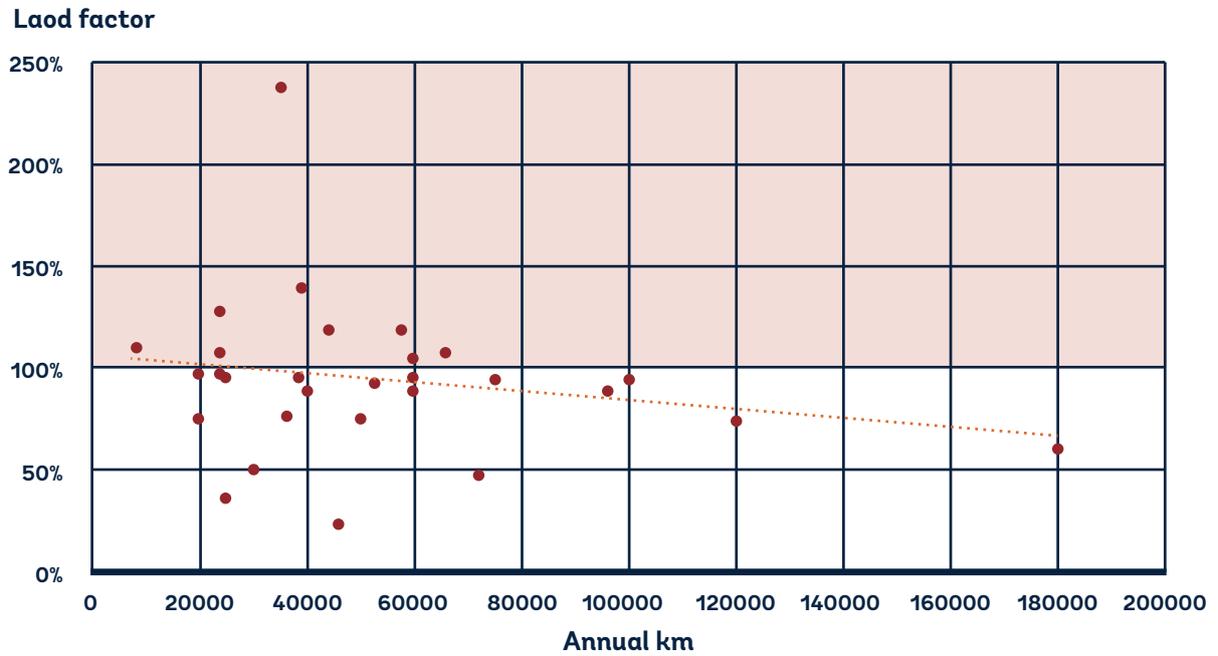
Taking into account total costs (per ton-km) and prices charged (per ton-km) to their customers, the company generates an operating profit between 5 and 20 percent* for each trip. However, the entire company only makes around 10 long-haul trips per month (of around 3 days each) and another 10 short-haul trips (of around 1 day each). The utilization of the company’s fleet is therefore around 10 percent (40 vehicle-days per month out of approximately 400 available vehicle-days). The fleet is idle 90 percent of the time

Fixed costs amount to LAK 500,000 (USD 61) per day or LAK 15 million (USD 1,830) per month. Vehicle fixed costs for a second-hand truck is LAK 200,000 (USD 24) per day and 400,000 (USD 48) for a new truck. Extrapolating those costs for a fleet of 13 trucks, monthly vehicle fixed costs range between LAK 78 million (USD 9,512) to LAK 156 million (USD 19,024). Downsizing the fleet is hardly possible due to weak demand for second-hand trucks. This weak demand can be attributed to (i) overcapacity in the Lao transport sector, and (ii) restrictive policies to import second-hand trucks and vehicles in neighboring countries. The result has been a big drop in prices for second-hand vehicles in Lao PDR.

In light of the continuously accumulating vehicle fixed costs, the current profit margins generated per trip are by far insufficient to sustain the company in the long-run given its current cost structure, fleet size and work load. In other words, the profits generated per trip are eaten up by the costs incurred when the fleet is idle, which reduces profits considerably and might even result in overall losses.

Note: * Depending on the depreciation period.

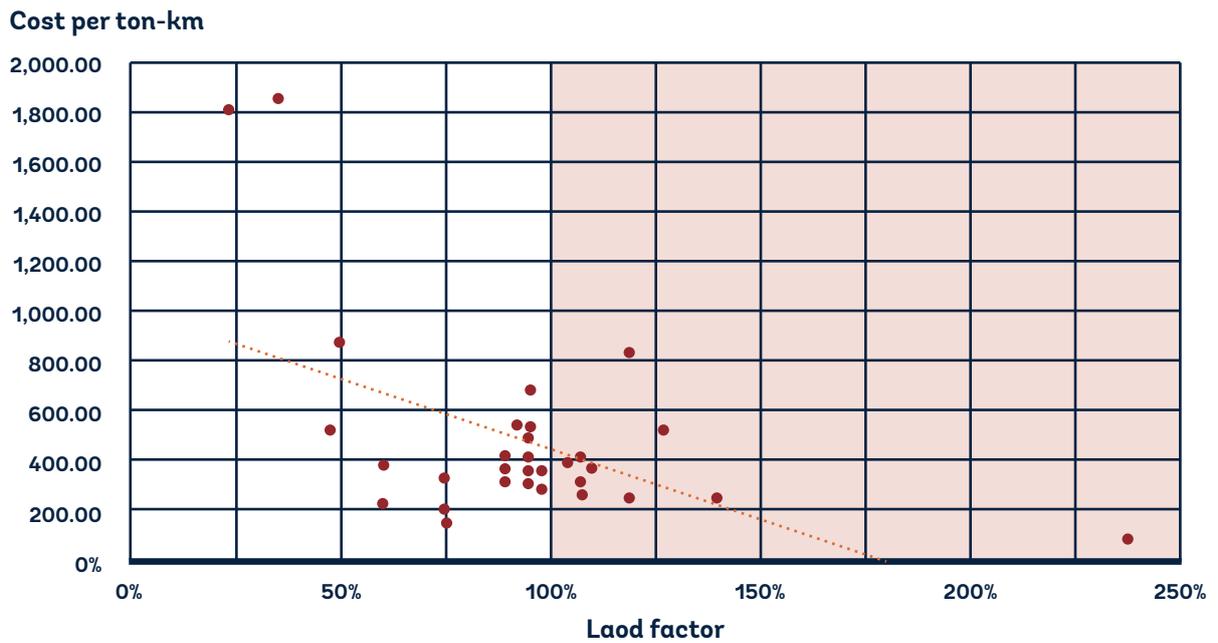
Figure 13 > Actual load factor and annual kilometer



Source: Authors.

Note: 100 percent loading capacity equals legal weight limits.

Figure 14 > Profit distribution (in percent) for all observations



Source: Authors.

Note: 100 percent loading capacity equals legal weight limits.

- Due to the large overcapacity in the sector, transport companies will accept any rate that is above their variable costs to increase vehicle utilization and recover some of their sunk costs. The data shows that prices¹⁰ are consistently above variable costs and thereby help reduce losses. Based on this calculation, only one company showed losses (and transport is not their primary business). Using only variable costs, the average profit margin is 43 percent.

Overloading

According to an ADB funded study (2015, p. 14)¹¹ on road sector governance, overloading is highly prevalent in Lao PDR with no end of this trend in sight. Levels of overloading are even higher where there are no fixed weigh stations; mobile weigh stations record higher levels since such checks are unannounced and therefore not anticipated by operators, in contrast with fixed weight stations. For more information on axle load limits in Lao PDR, refer to Annex II.

17 percent of companies interviewed admitted overloading. The average overloading amount was 26 percent of the vehicle's gross vehicle weight. One company even reported overloading of up to 250 percent of gross vehicle weight. Overloading is likely more prevalent than the numbers suggest, as companies might not have reported overloading in the survey, and some transporters might be

inclined to falsely report vehicle weight to be within official load limits. Additionally, the payment of informal fees to weigh stations is an indication that vehicles do not conform to existing weight limits. Given the low volume and weight density of Lao cargo, some transporters exceed by far the volume capacity of their vehicles (12-wheeler open trucks are particularly suitable for overloading).

The likelihood of overloading decreases with the annual utilization of the vehicle, as can be seen in Figure 13. In other words, companies with fewer kilometers driven per vehicle are more likely to overload. Overloading increases competitiveness of the individual service provider at the expense of public roads.

The effects of overloading on competitiveness of an individual transport company can be seen clearly in Figure 14. The average costs per ton-km decrease significantly with an increasing load factor. While overloading was common practice even in "good" times in Lao PDR, in the current environment with large overcapacity and low vehicle utilization, many feel it is the only option to remain profitable. The high cost of capital and the abundance of Japanese trucks on the market may also explain why Lao transporters were incentivized to invest in second-hand Japanese vehicles .

¹⁰ For this test, prices provided by the transport companies have been used.

¹¹ The report was funded by ADB but prepared by Oriental Consultants; International Development Center of Japan; Mekong Consultants. See Reference section for full citation.

> Contracts and price setting

A small number of companies from a handful of sectors¹² with large transport demand in Lao PDR operate either on own-account, on longer-term contracts with third-party transporters/forwarders, or a mixture of the two. The contracts are drawn up for a period of one to 5 years and usually specify an estimated volume, transport prices, routes, etc. Negotiations usually occur on an annual basis. If the parties do not agree, the contract is terminated.

To win contracts, operators are expected to provide a kickback to the customer. This is usually set at 10 percent and built into the rates. Nevertheless, contracts are in practice nothing more than a letter of intent as they are not enforceable. The exception to this is when operators purchase specific equipment on behalf of their clients. Even then, however, contracts do not necessarily protect companies. For example, when Phu Bia mine changed from Australian to Chinese ownership, the new management decided to discontinue its relationship with the existing transport company that had recently purchased 50 new vehicles, in spite of an existing contract. While contracts do not provide absolute certainty with regards to future work, they are nonetheless useful because they can be used to access cheaper financing with financial institutions (i.e. for working capital or assets).

Personal or family relationships play a large role in the business culture in Lao PDR. Many transport companies have a family connection with their customers and have deployed vehicles at the behest of the customer in return for guaranteed work. While they are also covered by “contracts”, the relationship is what holds the deal together. Gifts are not unusual to strengthen the relationship.

Commercial relationships are similar to family relationships and gifts are also common practice to deepen ties between companies. This practice is not exclusive to Lao PDR as it happens in developed Asian countries too. Lao trucking companies see it as a cost of doing business. In some cases, the cost is recovered through inflated prices or dummy loads. This custom of gifting the client (all throughout contracts) may also partly explain the large difference between prices provided by truckers and prices provided by clients. If considering this together with the likely underestimated costs due to low vehicle utilization and overcapacity in the sector, profit margins decrease significantly.

In spite of rates being pre-determined in contracts, they are by no means fixed. Some contracts specify what triggers a change in transport rates and by how much, while other contracts will be re-negotiated when volumes decrease. However, the client is unlikely to give the work to other operators for a lesser price. Due to the existing relationships, both parties are likely to negotiate a solution.

For the spot market, each provincial department of public works regularly publishes transport rates to most common destinations. The rates are agreed upon in cooperation with the local trucking association and based on distance, road conditions and elevation levels. Although this is only seen as a guide, operators tend to abide by those rates. Considering the data from the cost survey, the spot rates seem to be set very generously in favor of operators.

In general, the operators do not appear willing or able to redirect their activities and compete for work. Operators have a tendency to protect what they have rather than compete for new contracts. Their fate often lies with a small number of customers, if not a single customer. If this business disappears, the operators seem unable to find new customers or compete in tenders.

¹² Including beverages, mining as well as some construction companies for large infrastructure projects and cement.





4 > Policy options and regional trade

Historically, Lao transporters have operated the vehicles that were available to them, rather than the ones most suitable to the task. The supply of good second-hand trucks from Japan in particular has meant that the transport industry has come to rely on 12-wheelers. While these 5 or 6 year old trucks are well maintained and in good condition when bought from Japan, they are far from ideal for the road conditions in Laos. They are designed for good roads and higher cruising speeds. They are not designed to be overloaded and driven on the steep mountain roads of Lao PDR.

Downsizing the fleet or vehicle size is practically impossible in the current market. Due to low freight demand in the domestic market, there is no demand for second-hand vehicles. In the past, operators were able to sell their second-hand trucks at a good price, even after 10 years of usage in Lao PDR. This is no longer the case (see section on Transport market). The price of 5-year old vehicles has dropped from USD 50,000 around four years ago to only USD 25,000 today. This decline in prices is expected to continue with other countries further limiting the import of second-hand vehicles. Operators report that the market for second-hand vehicles has basically collapsed and it is hard to dispose of used trucks for anything other than spare parts. As an upside, maintaining the current fleet gives operators the opportunity to take on larger loads when they occur.

The Vientiane – Boten route provides a showcase for how market liberalization policies and international competition can contribute to reduced domestic transport prices. The increased competition from Chinese operators has led to substantially lower transport prices along the Vientiane - Boten route compared to the Vientiane

– Luang Prabang route. The direct delivery of Thai and Chinese trucks to the destination within Lao PDR (rather than transshipping at the border onto a Lao truck) has reduced transport prices and the work load for domestic operators considerably and may be the final trigger for a mass exodus of Lao firms from the transport market. For Lao consumers this is good news. Importers and exporters already benefit from lower prices for international cargo. Export competitiveness of Lao products increases as the final price of Lao products delivered abroad decreases.

The cost and price data analysis has shown that many transporters generate losses while operating, in part because of large overcapacity in their fleet. New, domestic focused market entrants have exacerbated the situation. Many operators now face a fundamental choice: Since downsizing is not an option and many companies are dying a slow death, they can exit the market to cut losses, or take the risk of investing in a new fleet to make profits. The latter would require reducing transport costs substantially. The recent research by IDE-JETRO (2017) comparing Lao and Thai transport costs suggests a cost reduction between 29 and 55 percent. This can only be achieved with investments in newer, more fuel-efficient vehicles. Investments in new vehicles would require an annual mileage of at least 75,000 km (not the current average of 55,000 km). This would reduce fixed and vehicle fixed costs by about 20 to 35 percent per km driven. The transporters would then have a larger, more economical asset to operate with. Savings in variable costs are estimated to be around 15-30 percent due to the higher fuel efficiency of newer trucks and lower expenditure on tires (together those account for 70 percent of variable costs). Cost savings could

be even greater if the current high costs to access finance were reduced.

Given the current market situation with fixed routes and static market shares, as well as the relatively small cargo volumes (due to the absence of major manufacturing or domestic agricultural distribution activities within Lao PDR), it is unlikely that the domestic market offers sufficient opportunities to reach the required mileage of 75,000 km per year. But opportunities for engaging in international transport may provide the necessary vehicle utilization to invest in new trucks.

So far, Lao transport operators have been excluded from international operations. Although cross border international freight traffic should not have a major effect on domestic transport, it does in Lao PDR due to the large amount of imports from China and Thailand. The domestic transport operators have benefited from cargo entering at Boten (at the Chinese border) and from the Thai borders, most notably in Chong Mek and Vientiane. But the lack of semi-trailer capacity is beginning to take its toll. Customers now prefer to use Thai, Chinese and Vietnamese trucks straight to their destinations and not transship onto Lao 12-wheelers at the border. Rather than embracing the demand for semi-trailers and the movement of containers and cargo on one vehicle, the trucking industry together with the Lao international freight forwarders association (LIFFA) continue to favor the transshipment model, in which all cargo is transferred at the border onto Lao trucks. This would not only delay the arrival of cargo, it would also increase costs, risk of damage and introduce greater uncertainty regarding delivery times (see Box 5).

From a regulatory perspective, Lao trucks can travel freely within the Greater Mekong Subregion thanks to existing bilateral agreements with all neighboring countries. Given Lao PDR's location, there are considerable opportunities for Lao

operators to embrace regional trade and the international movements of goods. For example:

- Trade between Thailand and Vietnam: Around 10 years ago, cargo volumes amounted to 20-30 trucks a week. Presently, it is an estimated 5,000-6,000 trucks per week, but few Lao operators are involved in this trade.
- Trade between Thailand and China: Most manufacturing components between Thailand and China are now transported by road. The transshipment of fruit and vegetables between Thailand and China takes place at Boten in Laos. Yet, no Lao transporters are involved in these operations.

Lao transporters could provide transport services (and customs brokering, etc.) without transshipment or use integral trailers instead of containers to be more competitive. The example of the Netherlands in Europe highlights how a small economy can take advantage of its location: Dutch trucks operated from Germany to Spain even before the single market. The only condition was to cross "home territory" along the way. This opportunity also exists for Lao PDR, but the window is closing with the growing logistics capacity in Vietnam and Thailand.

Another key aspect of tapping into regional trade opportunities is greater access to Laem Chabang and Bangkok ports, as the majority of international trade transits through these hubs. Currently, very few trucks can access the ports because of transit bond issues. The share of Lao containers is only 60,000 out of the 7 million annually. This opportunity should be pursued rigorously through bilateral negotiations.

Box > 5



The transshipment model

The transshipment model proposed by LIFFA and other Lao stakeholders would likely prove more expensive for transport users than current practices. All cargo entering and exiting Lao PDR would need to be transshipped between a Lao and foreign truck.

For containerized cargo, a lift-on/lift-off transshipment costs approximately USD 80-100. Transit cargo from Thailand via Lao PDR to China or Vietnam would be at least USD 160-200 more expensive just because of the container movement. Currently this cargo must be transshipped only once, usually between two foreign trucks. One company indicated that importing cargo directly to the destination is approximately 30 percent cheaper than transshipping the goods onto a Lao truck at the border.

Non-containerized cargo, such as the fruit and vegetable trade between Thailand and China, would need to be manually transloaded two times as well (it is currently transloaded once in Boten). Each transshipment takes approximately 4-5 hours and is completed with manual labor. Transloading the cargo disrupts not only the cold chain but also increases the risk of damage and spoilage of cargo. Additionally, very few Lao transporters have the necessary experience and equipment to handle reefer cargo. The costs of manually transloading a 40 ft. reefer container are estimated to be similar to those for containerized cargo.

A practical consideration is that most foreign trucks entering Lao PDR tend to be semi-trailers. Since Lao transporters predominantly use 12-wheeler trucks with lower carrying capacity, two Lao trucks would be needed to match one foreign vehicle which in turn would drive up transport costs considerably.

Transshipment also carries a number of hidden costs. In order to effectively transship cargo between two trucks, schedules must be aligned carefully in order to reduce wait times. With average estimated vehicle fixed costs between USD 100-200 per day, delays of all types become even more costly. Involving two trucks would double the cost.

Additionally, whereas manual transloading does not require infrastructure (other than sufficient space for 2 trucks), lift-on/lift-off operations require a crane, which are a significant capital investment. Cranes require careful maintenance to prevent frequent breakdowns and extend their lifespan. In some cases, warehouses and other infrastructure are also needed to support transshipment operations, all of which drive up transport costs.

Sources: (Ksoll & Quarmby, 2012), Authors



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Annex I › Technical notes on the variables used in the models

Fixed costs

Regulatory compliance costs

Many firms reported that official costs to obtain the necessary licenses and permits are very low. However, it seems that many transport operators have to pay relatively large, agreed-upon informal fees to various authorities (including tax authorities and the police, for example) as an expected additional cost of doing business. These costs have been recorded as overhead.

Staff costs

- **Management:** In some cases, the owner of the transport company does not receive a monthly salary but regularly extracts cash from the company to finance personal daily expenditures. These withdrawals have been estimated as salary.
- **Warehouse:** Staff costs associated with warehouse operations have been included if the warehouse was a critical part of the transport operations. During data collection there was inconsistency about whether daily laborers were included or not, but since wages for daily laborers are very low, the impact on overall transport costs is estimated to be marginal.
- **Drivers:** Only the base wage of drivers and assistant drivers has been recorded as fixed costs. In Lao PDR, it is common practice to provide a daily allowance for overnight trips. This has been recorded as variable costs.

Company facilities

- **Office space:** In many cases, transport companies own their office facility, often as the family residence. For those companies that do

not incur any costs for the facility, none have been assigned. Companies that rent their office space have been costed with the actual rental fees. Running costs have been included in the analysis regardless of ownership status.

- **Company cars:** Where information on company cars was available, they have been depreciated over a period of 5 years using a linear method. The annual depreciation has been added to company facility costs.

External loans

External loans have been taken into account in so far as they require regular repayments (monthly, quarterly or annual). In such cases, the payments have been calculated on an annual basis. Where such information was not available, estimations have been made using interest rate, loan amount, and duration of the loan. In the absence of external loans, no capital costs have been accounted for.

Assumed fleet cost

Companies with a large fleet have higher capital costs than companies with a small fleet. No detailed information on the overall fleet costs was obtained due to time constraints during the interview. In order to take capital costs for the fleet into account, several assumptions were made for the fleet of each company:

- The vehicle fleet of every company has an average age (new, 2.5 years, 5 years, 7.5 years, 10 years). This estimation was based on observations made during the interview.
- The purchase price of each vehicle type was estimated based on values obtained during the study and authors' experience.

- Truck values were estimated for vehicles of different ages (new, 2.5 years, 5 years, and 7.5 years) to obtain average fleet value based on actual fleet parameters. At 10 years, the vehicle value was set at 0.

To calculate the capital costs, additional assumptions were made:

- Capital costs were fixed at 7 percent (in line with other capital costs).
- The share of vehicles under financing has been estimated to be 50 percent for all companies (unless known otherwise).

Vehicle fixed costs

Capital costs for vehicle financing

There are three main vehicle financing options in Lao PDR: (i) owner financing, where the owner pays the full purchase price with his own funds, (ii) financing through external sources (i.e. bank, friends, business partners), and (iii) leasing, or a combination of the three:

- **Owner financing:** With owner financing, the transporter still incurs capital costs in the form of opportunity costs. Such capital costs have been priced based on the deposit rate of Lao banks (for LAK), at 7 percent.
- **Financing through external sources:** The study did not differentiate between different types of external financing. To establish the annual operating costs of trucks, annual repayments were estimated, either by adding up the monthly payments, or determining them using the actual interest rate, loan amount and duration of the loan. The rates in the market vary widely and can be as high as 5 percent per month (60 percent per year).

- **Leasing:** If available, the monthly leasing rates have been accrued to obtain annual leasing costs.

- Combination of the above sources of finance: The costs of each source of finance has been calculated to obtain a complete picture.

- Regulatory compliance costs

- **Registration:** Vehicle registration is valid for a period of up to five years. The annual costs were used to calculate annual operating costs.

- **Insurance:** Only vehicle insurance has been used in this cost item.

- **Operating license for the truck:** In some cases, a separate operating license for the truck must be obtained.

Depreciation

The cost of depreciation of the vehicles has been taken into account despite not many companies applying depreciation or other measures to take into account vehicle capital losses. In this study, the depreciation period applied is 5 years, in accordance with international standards, across all companies, even though some use their vehicles for much longer periods. The study assumed a linear depreciation method. New and used vehicles are treated differently:

- New vehicles are depreciated over five years. Unless otherwise indicated by the interviewee, the remaining value of the vehicle after five years is estimated to be 30 percent.

- Second-hand vehicles are depreciated over five years too. The remaining value of the vehicle after five years is zero. Since major repairs can be expected to occur within the five year period, an estimate of such major repair costs has been taken into account.

Variable costs

Variable costs are calculated for a specific route using a specific vehicle (as opposed to for the whole fleet). This approach allows to distinguish different cost types for different vehicles (for example, the difference between a 6-wheeler and a 22-wheeler).

Staff costs

This item captures all variable staff costs. In most cases it includes a trip allowance for traveling staff. Traveling staff are the driver, and in some cases, an assistant driver and loading staff.

Fuel costs

During the time of the study, diesel prices increased from around LAK 7,150 to LAK 7,620 depending on the exact geographical area. In order to maintain cost comparability, diesel prices have been fixed across all companies at LAK 7,150.

Vehicle maintenance

The study distinguishes between two types of vehicle maintenance: (i) permanent vehicle service, before or during the trip to ensure vehicles runs smoothly, and (ii) periodic vehicle service, such as oil filter changes, every 5,000 or 10,000 km. To establish the total vehicle maintenance costs, the permanent vehicle service costs were estimated on a per-trip basis, and the periodic vehicle service costs were calculated for the distance of the particular trip being assessed.

Tires

Tire costs have been estimated using the same methodology as for periodic vehicle service (see above).

Insurance

Trip-based cargo insurance offered by transport service providers practically does not exist in Lao PDR. At present, only one of the companies surveyed offers this service.

Other variable costs

This item captures all other variable costs. Most notably, these are informal payments (i.e. tea money), road tolls, parking fees, border pass fees, weigh bridge fees, labor costs (for loading and unloading the vehicle at point of origin and destination), and others. In some cases, it was not possible to obtain more details on informal payments because respondents did not want to reveal unlawful practices, such as overloading, for example. Where possible, further information was collected.

Transport prices

In order to meaningfully interpret the transport prices collected by the study team, various conversion rates have been used:

TEU/FEU/Full truckload (by size of truck) in cbm:

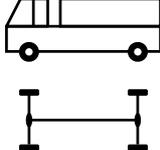
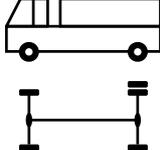
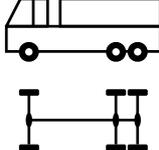
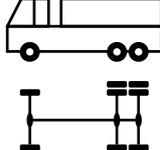
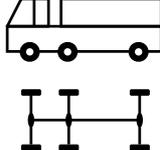
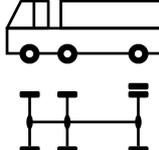
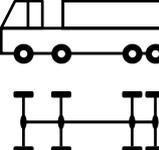
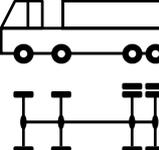
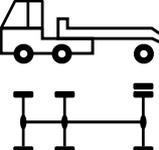
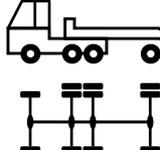
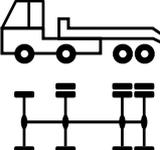
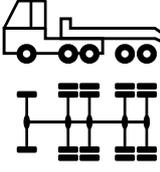
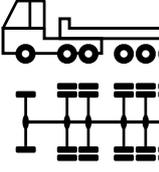
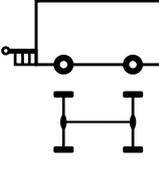
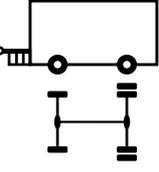
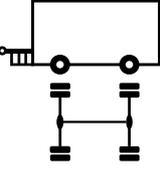
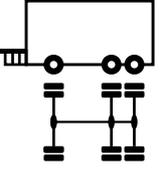
		Full truckload											
	TEU	FEU	4-wheelers	6-wheelers	8-wheelers	10-wheelers	12-wheelers	14-wheelers	18-wheelers	22-wheelers	24-wheelers	28-wheelers	32-wheelers
in cbm	33.2	66.4	10	25	30	35	50	50	65	65	90	100	100

TEU/FEU/Full truckload (by size of truck) in tons:

		Full truckload										
	4-wheelers	6-wheelers	8-wheelers	10-wheelers	12-wheelers	14-wheelers	18-wheelers	22-wheelers	24-wheelers	28-wheelers	32-wheelers	
tons	6.0	7.8	19.2	13.2	15.2	18.2	25.4	30.6	32.4	40.6	44.8	

Annex II > Axle load limits in Lao PDR

Figure 15 > Axle load limits in Lao PDR (as of 26 September 2013)

 <p>Weight Limit/Load Requirements</p>	 <p>2 axles / 4 wheels Max. G.W. 9,500 kgs.</p>	 <p>2 axles / 6 wheels Max. G.W. 14,100 kgs.</p>	 <p>3 axles / 6 wheels Max. G.W. 16,00 kgs.</p>	 <p>3 axles / 10 wheels Max. G.W. 23,200 kgs.</p>	 <p>3 axles / 6 wheels Max. G.W. 13,500 kgs.</p>
 <p>3 axles / 8 wheels Max. G.W. 17,500 kgs.</p>	 <p>4 axles / 8 wheels Max. G.W. 20,000 kgs.</p>	 <p>4 axles / 12 wheels Max. G.W. 27,200 kgs.</p>	 <p>3 axles / 10 wheels Max. G.W. 23,200 kgs.</p>	 <p>4 axles / 14 wheels Max. G.W. 32,300 kgs.</p>	 <p>4 axles / 14 wheels Max. G.W. 32,300 kgs.</p>
 <p>5 axles / 18 wheels Max. G.W. 41,400 kgs.</p>	 <p>6 axles / 22 wheels Max. G.W. 49,600 kgs.</p>	 <p>2 axles / 4 wheels Max. G.W. 14,000 kgs.</p>	 <p>2 axles / 6 wheels Max. G.W. 16,100 kgs.</p>	 <p>2 axles / 8 wheels Max. G.W. 18,200 kgs.</p>	 <p>3 axles / 12 wheels Max. G.W. 27,300 kgs.</p>

Source: Ministry of Public Works and Transport, Lao PDR

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