



Vietnam Transport Knowledge Series

AUSTRALIA–WORLD BANK GROUP STRATEGIC PARTNERSHIP IN VIETNAM

Strengthening Vietnam's Trucking Sector

Towards Lower Logistics Costs
and Greenhouse Gas Emissions

Yin Yin Lam, Kaushik Sriram, and Navdha Khera

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Foreword

Over the past decades, Vietnam has experienced one of the highest sustained GDP growth rates in the world, between 5 and 8 percent annually. Through this strong economic growth, Vietnam has lifted millions from poverty: while in 1993 half the population still lived on less than US\$1.90/day, by 2016 this was down to less than three percent. However, the road leading Vietnam out of poverty stretches ahead, with approximately 9 million Vietnamese still living in extreme poverty.

Vietnam's strong trade growth underpins the country's economic development. Indeed, Vietnam has earned the reputation as one of the key manufacturing locations in Southeast Asia. However, increased competition for manufacturing locations has sparked debates over global supply chains, free-trade agreements, and on-shoring. Just as many other countries have, Vietnam has depended on lower manufacturing costs to provide a competitive advantage; now, in order to compete in the global market, Vietnam must seek growth opportunities in supply-chain efficiencies. All trade depends on the supply chains linking production and consumption locations within Vietnam and beyond. Bolstering those supply chains—by improving logistics efficiency, a backbone of trade—can help Vietnam secure a competitive position in the global marketplace and ensure continued economic development.

Trucking carries important implications for logistics costs and greenhouse gas (GHG) emissions. As the dominant mode of goods transport in Vietnam, trucking accounts for 77 percent of domestic tons transported. Vietnam's logistics costs totaled an estimated 21 percent of GDP, a relatively high figure. In addition, the transport sector contributes 10 percent of Vietnam's national GHG emissions. Consequently, before Vietnam can lower logistics costs and reduce GHG emissions, the country must better understand and strengthen its trucking sector.

Trucking is an understudied sector, both in Vietnam and worldwide. This first-ever trucking-focused study in Vietnam hopes to shed light on this often-opaque sector. Based on extensive primary interviews with trucking-related public and private stakeholders, companies, and drivers, this study has built models to provide insights into key intercity freight flows, as well as drivers of costs and GHG emissions. The study conducted a comprehensive operational assessment of Vietnam's trucking sector, along the dimensions of infrastructure, processes, and supply and demand.

With policy-oriented analysis, the report recommends policies that could be embraced by the public sector to promote positive actions by the private sector, the main source of investments in trucking.

The report proposes policies that could encourage increased and better-quality investments by the private sector—at the levels of trucking and logistics companies, fleets, and drivers. The report also makes the case for public infrastructure and processes that could improve trucking as a transport mode. Shifting Vietnam to a multimodal transport system that takes advantage of inland



waterways and coastal shipping options represents a holistic solution; in recognition of this, the report promotes intermodal as well as consolidated infrastructure and processes. Furthermore, to leverage technology, the report encourages the sector to use digitization and apps to help transform the landscape of trucking cargo demand-supply matching.

We hope this report prepared by the World Bank lays the foundation for a national trucking strategy for Vietnam, which would, in turn, contribute to enhanced trade competitiveness and development for Vietnam's citizens.



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Abbreviations

3PL	Third-Party Logistics
ASEAN	Association of Southeast Asian Nations
CAAV	Civil Aviation Authority of Vietnam
CAGR	Compound Annual Growth Rate
CBU	Completely Built Up
CKD	Completely Knocked Down
CO ₂	Carbon Dioxide
CVTS	Commercial Vehicle Tracking System
DRVN	Directorate for Roads of Vietnam
FDI	Foreign Direct Investment
FEU	Forty-Foot Equivalent Unit
FTL	Full Truckload
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoV	Government of Vietnam
GVW	Gross Vehicle Weight
HCMC	Ho Chi Minh City
ICD	Inland Container Depot
ISO	International Organization for Standardization
IWT	Inland Waterway Transport
JICA	Japan International Cooperation Agency
Km	Kilometer
LSP	Logistics Service Provider

LTL	Less Than Truckload
MoIT	Ministry of Industry and Trade
MoT	Ministry of Transportation
MtCO ₂ e	Million Metric Tons of Carbon Dioxide Equivalent
OD	Origin-Destination
OEM	Original Equipment Manufacturer
RFID	Radio Frequency Identification
RO-RO	Roll-On/Roll-Off
ROCE	Return on Capital Employed
SME	Small and Medium-Sized Enterprises
SOE	State-Owned Entity
SDR	Special Drawing Rights
TCO	Total Cost of Ownership
TDSI	Transport Development and Strategy Institute
TEU	Twenty-Foot Equivalent Unit
UCC	Urban Consolidation Center
VAMA	Vietnam Automobiles Manufacturers Association
VEC	Vietnam Expressway Corporation
VINAMARINE	Vietnam Maritime Administration
VIWA	Vietnam Inland Waterways Administration
VLA	Vietnam Logistics Business Association
VND	Vietnamese Dong
VR	Vietnam Register
VRA	Vietnam Railway Authority

Executive Summary

Roads form the backbone of freight transportation in Vietnam. In 2016, roads accounted for 77 percent of the freight volume transported in the country. Logistics costs in Vietnam account for nearly 21 percent of the Vietnam's GDP, higher than most of its peers in the Association of Southeast Asian Nations (ASEAN), which affects the competitiveness of exports and adds to the cost of goods for producers and consumers. Further, the Government of Vietnam (GoV) has signed multiple climate treaties and has been focusing on reducing the greenhouse gas (GHG) emissions in the country. The trucking sector contributes to nearly 4 percent of the country's emissions, while the transport sector as a whole contributes about 10 percent. Yet, the Vietnam trucking sector is understudied. This study takes a first-ever comprehensive look at the trucking sector to define policies aimed at (a) reducing logistics costs, greenhouse gas emissions, and the emission of local pollutants in truck-based supply chains; (b) improving the functioning and attractiveness of the trucking sector as an industry to attract quality private sector investments; and (c) improving the regulatory, planning, and oversight practices by the public institutions responsible for the trucking industry at the national and sub-national levels.

Methodology

The study encapsulates the findings of a nationwide trucking survey with more than 1,400 truck drivers and more than 150 companies from the trucking industry, to understand the commodity flows, logistics costs, and GHG emissions. The study built three original ground-up models to estimate the main intercity trucking flows, the key drivers of transport costs, and GHG emissions. To form a detailed operational assessment, apart from the quantitative modeling done, the study also includes insights into truck operations through extensive surveys and structured interviews with truck operators, shippers, and logistics companies operating on intercity as well as intra-city routes. Based on the various assessments, the study proposes 14 policy options to strengthen the trucking sector, and to lower logistics costs and GHG emissions. The policy interventions are divided across four categories related to trucking: infrastructure-related, supply side, demand side, and process-related.

Intercity operational assessment

The operational assessment of the trucking industry highlights the key challenges faced by industry players. One of the major issues is the high competition in the market due to excessive fragmentation, which drives down the margins and sustainability of the trucking sector. The average number of trucks per company is around five, with the highest fragmentation seen in the Northwest, Northeast, and Red River Delta regions. Fleet mix in Vietnam is extremely skewed towards small trucks (68 percent of the country's truck fleet is less than 5T in size), which adds to the congestion on roads. The national trucking survey indicates the industry welcomes policies aimed at providing a safer environment for truck drivers, highlighting the importance of road safety for policy making in future. Other key concerns found by the study include the expense of informal fees (about 10 percent of a truck operator's cost) and limited platforms for efficient supply-demand matching (about 50 to 70 percent empty backhaul for some operators).

The demand assessment indicates eight major routes, from/to Hanoi–Hai Phong, Hanoi–Ho Chi Minh City (HCMC), HCMC–Da Lat, and HCMC–Can Tho, as the key routes for commodity flows and accounting for nearly 30 percent of the overall intercity flows in the country. The study also highlights the status of road infrastructure and analyzes the government expenditure on overall infrastructure in the country. While the GoV spends 8 percent of the GDP on infrastructure, only 1.2 percent is dedicated to road infrastructure. This proportion of spend on road infrastructure to total spend on infrastructure in the country is lower for Vietnam as compared to its peers. The study also covers two other potential modes—coastal shipping and inland waterways—to divert the traffic from roads. These modes currently account for 5 percent and 17 percent of the domestic freight flow (in tons) respectively.¹ With a coastline of 3,200 kilometers and approximately 19,000 kilometers of inland waterways, Vietnam has the potential to increase multi-modality in the transportation of goods within the country, which could be beneficial to logistics costs and GHG emissions.

This report discusses the specific gaps in the current infrastructure of the ports and waterways, the cargo handling equipment available at landing stages, market structure in terms of availability of coastal shipping lines, the size and design of the vessel fleet, and the supporting infrastructure at inland container depots (ICDs).

Urban trucking operational assessment

The study also discusses the urban itineraries, which are the first- and last-mile deliveries for the intercity routes and the drayage to and from ports. The study covers case studies of two main cities—Hanoi and Ho Chi Minh City (HCMC)—and aims to understand the impact of urban factors, including restricted truck entry timings and passenger traffic congestion on roads. Many logistics companies have offices set up in Hanoi; consequently, the city acts as a transit stop for goods brought from and sent to Hai Phong port. On the other hand, the presence of Ho Chi Minh port near the city center leads to high truck traffic within the city. Serving as access roads connecting the ports to the nearest highway, the city roads—already highly congested with passenger vehicles—also add to the traffic volume. The study indicates limited separation of industrial and residential zones via land use planning in these cities as well as lack of consolidation via urban consolidation centers. This impacts the productivity of the logistics companies due to their sub-optimal route planning, heavy city traffic congestion, and lack of dedicated city-port roads.

Logistics costs and GHG assessments

The cost assessment model talks about the key drivers for controlling the transportation costs for the truck operators. With transportation costs accounting for nearly 60 percent of the overall logistics costs, the study covers this significant cost aspect. The transportation costs are estimated (in Vietnamese dong) at VND 2,775 per ton-km and VND 952 per ton-km for a short-haul and long-haul operator, respectively, with margins ranging from 3 to 5 percent for small truck operators owning fewer than 10 trucks. The top five cost heads for the truck operators are fuel costs, tolls, informal fees, interest costs, and driver salaries, which account for 80 percent of the total costs. The model indicates that the logistics costs per ton-km reduces with an increase in the number of trucks owned, increase in tonnage of trucks, and better truck utilization rates.

Further, the GHG emission efficiency for Vietnam is estimated at 143 g of CO₂ per ton-km. The model identifies three areas, which directly affect the GHG emission efficiency and form the cornerstone of policy imperatives—fleet mix, backhauling, and road infrastructure.

Policy options

The study culminates with a discussion of policy options aimed at strengthening the trucking sector and reducing logistics costs and GHG emissions in the country—based on the key challenges and issues identified in the study—along with the key drivers identified for logistics costs and GHG emissions. The policy interventions are divided across four categories: infrastructure-related, supply side, demand side, and process-related. The key policy recommendations for each category include the following:

- Infrastructure-related policy options
 - Reduce congestion around ports through the provision of centralized parking bays and consolidation yards near ports (short-term) and widening of roads, strengthening of roads to handle heavier trucks, lane reservation, and dedicated truck corridors (medium-term).
 - Promote “container-on barges” to boost inland waterway transport (IWT) usage by adopting fleet sizes/designs/waterways suitable for containerization, allocating berthing windows at maritime ports for IWT barges, along with improving container handling facilities at river ports.
 - Promote coastal shipping on the North Vietnam–South Vietnam route by encouraging more coastal shipping lines, domestic shipping centers, reduced port handling costs for domestic cargo, and increased RO-RO vessels that promote trucking–coastal itineraries.
 - Integrate logistics centers and urban consolidation centers (UCCs) in the existing ICD master plan, with logistics centers prioritized at ICD locations closer to industrial zones and UCCs prioritized at the city fringes of Hanoi and HCMC.
 - Prioritize and upgrade the road infrastructure of the eight key routes, taking into account the major share of intercity trucking traffic. Elevated roads, overpasses, additional lanes, and lane reservations can be explored.
- Supply-side policy options
 - Introduce a truck fleet modernization program with incentives for truck owners to scrap their older vehicles. This could include offering registration tax waivers and scrap value rebates, and encouraging OEM discounts.
 - Vary existing road user charges with fleet age to disincentivize the use of older trucks.
 - Strengthen driver training by adding personal health and safety components and physical tests. Enhance the licensing process through periodic trainings for the renewal of licenses. Making a registry of licensed drivers and their driving records available to trucking companies could also increase the quality of truck drivers.

- Improve Vietnam’s fleet through a growth-based lending scheme aimed at preferential lending rates for the purchase of more fuel efficient and larger-sized trucks, subject to company growth, to reduce excessive trucking sector fragmentation.
- Establish cooperatives for owner-operators to allow the smaller players to pool resources and help them achieve scale efficiencies. Simplify the implementation of regulations specifying minimum assets per trucking company.
- Demand-side policy options
 - Promote brokerage firms through defining regulations for the registration of brokers, providing incentives for brokerage firms, allowing 100 percent foreign direct investment (FDI) for successful foreign brokerage firms to set up branches in Vietnam and encouraging cooperatives to create pan-Vietnam brokerages.
 - Increase investments in digital freight aggregator models through government policies promoting fundraising, research and development, FDI, mentorship, and open data sharing.
- Process-related policy options
 - Launch an issue resolution mobile app to report issues faced by a truck driver during his trip, such as accidents and informal payments, along with an issue resolution committee to resolve the issues.
 - Roll out e-tolling and CCTV cameras at tollbooths along key routes to avoid the unnecessary and unauthorized stopping of trucks, which increases costs and emissions.

These policy interventions are expected to drive the following changes in the sector:

- Reduction in road freight share
- Improvement in truck utilization rates
- Reduction in vehicle ages
- Increase in the average carrying capacity of fleet
- Reduction in transit times
- Improvement in driving ethics and governance

The study estimates the successful implementation of these recommended policies could reduce transportation costs by approximately 16 percent, while lowering GHG by approximately 7 percent.

Other positive impacts of the recommended policy options include reduced pollutants (by about 14 to 16 percent per ton-km), reduced road damage (by approximately 5 percent), reduced number of accidents (by about 10 percent), and reduced forex expenditure (by approximately 7 percent) resulting from lower required fuel imports due to the younger fleet and higher capacity utilization.

This report hopes to provide an enhanced understanding of the Vietnam trucking sector by providing a first-ever comprehensive and trucking-focused study of the sector. In turn, the greater understanding of this dominant transport mode could form the foundation of a national trucking strategy to improve the sector's impact on logistics costs, the climate, and economic competitiveness.

Note

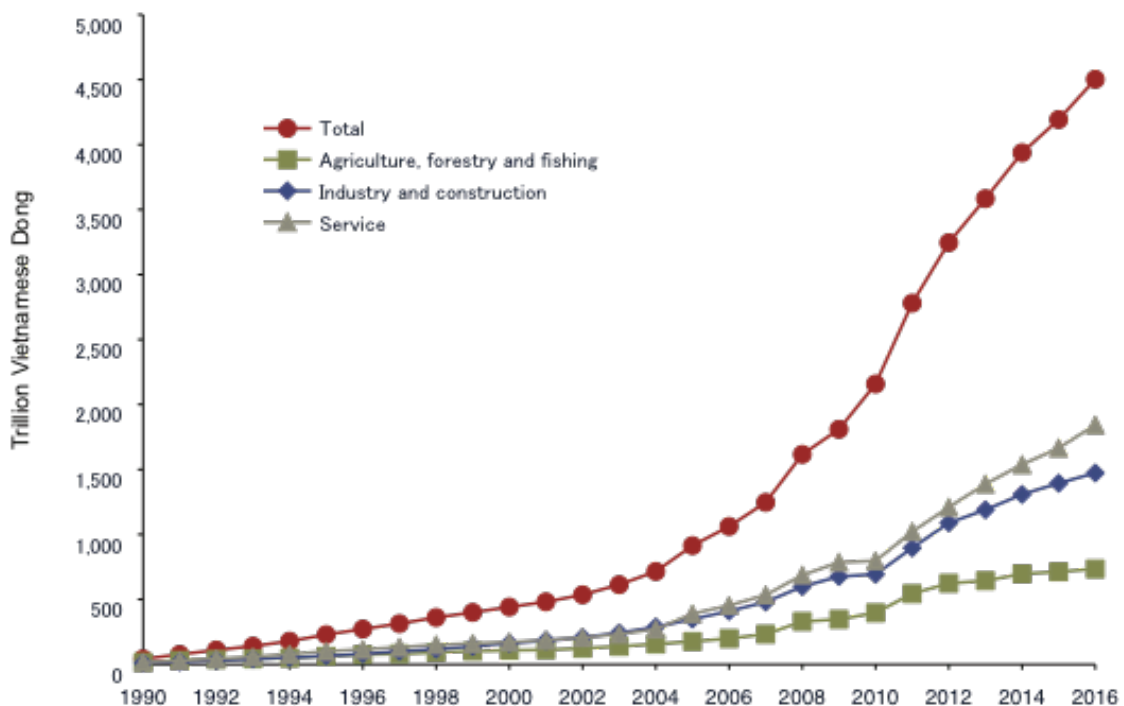
1. Railway's share is less than 1 percent.

Chapter 1: Introduction

Economic Growth and the Rise of the Trucking Sector

Since the adoption of Đổi Mới in 1986, the economy of The Socialist Republic of Vietnam (henceforth referred to as Vietnam) has transformed to a market-oriented model. This transition has fueled the country's economic growth. The Gross Domestic Product (GDP) of Vietnam has shown steady growth over the last decade, especially in the industrial goods, construction, and service sectors, with a GDP annual growth rate of 6 to 8 percent (figure 1.1).

Figure 1.1. Annual GDP in Vietnam Since 1990, at Current Prices by Economic Sector



Source: General Statistics Office of Vietnam.

Note: Current prices shown in trillion Vietnamese dong (VND)

This growth is expected to continue as the country aims to achieve annual average economic growth of 7 percent through 2020 (Vietnam News 2016a). The country has also laid out a master plan through 2035 to develop the industrial sector, with a national goal to achieve a 13 percent annual growth rate of industrial production value through 2020, 12.5 percent from 2021 to 2025, and 11.0 percent from 2026 to 2035 (GoV 2014).

As the economy has grown, three key trends have emerged, each exerting an impact on the nature and flow of freight on roads:

- Increased importing and exporting activities
- Increased urbanization and household consumption
- Concentration of logistics infrastructures in economic zones

For Vietnam to be effectively transformed into a global manufacturing hub and to satisfy domestic consumption and export needs, the country will need to be equipped with highly developed and systematic logistics services to ensure that products are distributed across—as well as into and from—the country in a timely and cost-effective way.

The Need for This Study

In 2016, an estimated 20.8 percent of Vietnam’s GDP went toward its national logistics (VoV 2017), a relatively high figure when compared globally. In recent years, Vietnam has shown significant improvement in its logistics services, jumping 25 ranks from 64th in 2016 to 39th, as listed in the Logistics Performance Index 2018, published by the World Bank (figure 1.2). However, there is still a need to strengthen Vietnam’s logistics sector and reduce logistics costs at the national level. Reducing logistics costs will improve the cost of doing business in Vietnam and eventually contribute to economic growth. Transportation costs account for approximately 60 percent of the total logistics costs in Vietnam.

In addition, greenhouse gas (GHG) emissions from the road freight sector contribute an estimated 4 percent of the overall GHG emissions in the country (Blancas and El-Hifnawi 2014), while the transport sector contributes approximately 10 percent of the country’s emissions (Li, Lu, et al 2015). As a signatory of the Paris Climate Agreement since 2016 and the UN Framework Convention on Climate Change (UNFCCC) since 1992, the Vietnam government has set a target for 2030 to reduce the stated GHG emissions by 8 percent. Considering this target, the trucking sector’s significant contribution to Vietnam’s overall emissions calls for an in-depth study and analysis of the road freight sector.

With roads forming the backbone of Vietnam’s freight transport, the share of road freight (in tons) has grown significantly over the years (figure 1.3), from 66 percent in 2006 to 77 percent in 2016. In terms of freight traffic, road transportation has grown from 20.5 trillion tons-km in 2006 to 56.6 trillion tons-km in 2016, which translates to a compound annual growth rate (CAGR) of nearly 11 percent—highest among all modes of transport.¹

Figure 1.2. Global Benchmarks for Logistics Costs and GHG Emissions

Country	LPI rank ^a	Logistics costs as percentage of GDP ^b	GHG emissions (grams of CO ₂ /GDP) ^c
Germany	1	8.5%	200
Japan	5	9.0%	190
Singapore	7	9.5%	155
United States	14	8.5%	300
Korea	25	9.5%	460
Vietnam	39	20.8%	1,090
India	44	13.0%	900
Brazil	56	12.0%	200

a. World Bank 2018. World Bank Logistics Performance Index ranking for 2018: <https://lpi.worldbank.org/>.

b. ADB (Asian Development Bank) 2012.

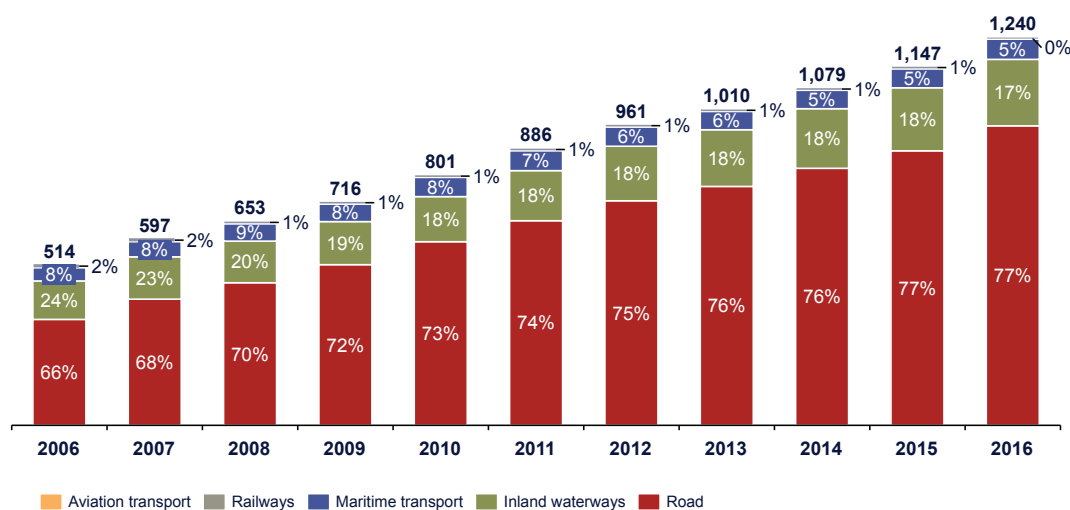
c. GHG emissions statistics taken from the International Energy Agency (IEA) and Organisation for Economic Co-operation and Development (OECD) database 2015, available here: <https://webstore.iea.org/co2-emissions-from-fuel-combustion-2018-highlights>. GDP in 2010 US dollars; GHG emissions refer to total emissions in the country.

Yet, with limited research and analysis on the costs and GHG emissions contributed by the trucking sector, the sector is understudied. Therefore, this study aims to develop a strong quantitative and qualitative understanding of the trucking industry structure, road freight demand, and supply across key origin-destination (OD) pairs, with a view to assess the efficiency of the trucking industry across operational, financial, and environmental dimensions.

For the first time, this study comprehensively brings together analytical models for OD flows, truck operator profitability, and GHG emissions to understand the trucking sector. The study's final objective seeks to define contextualized and actionable policy recommendations. These recommendations include public, public-private, or purely private interventions that (a) reduce logistics costs and emissions of pollutants in truck-based supply chains (b) improve the functioning of the trucking sector, and therefore promote private investments in the sector, and (c) improve the regulatory, planning, and oversight practices by public institutions.

Figure 1.3. Volume of Freight Carried by Mode of Transport, 2006–2016

In million tons and percentage of total



Source: Chart data generated via General Statistics Office of Vietnam statistics at http://www.gso.gov.vn/default_en.aspx?tabid=781.

Methodology

The study brings together information from primary sources, such as interviews with industry players and field surveys as well as secondary sources, including published literature and reports. As part of this study, in-depth interviews have been conducted with various stakeholders operating across the value chain to better understand their operational challenges. Interviewees ranged from large transporters and driver-owners, to organized intermediaries, such as freight exchanges and shippers. Interviews have also been conducted with staff from government organizations to understand the perspective on the Vietnam logistics sector from the viewpoint of policy makers.

Further, to access firm-level information normally not disclosed publicly, more than 150 trucking companies completed a survey, including asset and non-asset based logistics service providers (LSPs) as well as shippers with and without private fleet and truck operators. Information from these interviews and surveys, combined with secondary resources, helped to develop an understanding of the overall value chain of the transportation sector, covering supply factors, demand factors, infrastructure, and regulations.

Moreover, to understand the demand aspect, more than 1,400 truck drivers participated in a nationwide survey to develop a model for intercity flows of commodities. Data inputs from various government agencies, including the Directorate for Roads of Vietnam (DRVN), Vietnam Register (VR), and Transport Development and Strategy Institute (TDSI) have been incorporated into this study.

To ensure strong policy formulation based on comprehensive data collection and analysis, the study developed a robust framework (figure 1.4) that encompasses the four key factors that comprehensively cover and shape the trucking industry: demand, supply, infrastructure, and existing

regulations. The study views these factors through the lens of intercity and urban trucking. With the aim of reducing logistics costs and GHG emissions, the study proposes a policy roadmap.

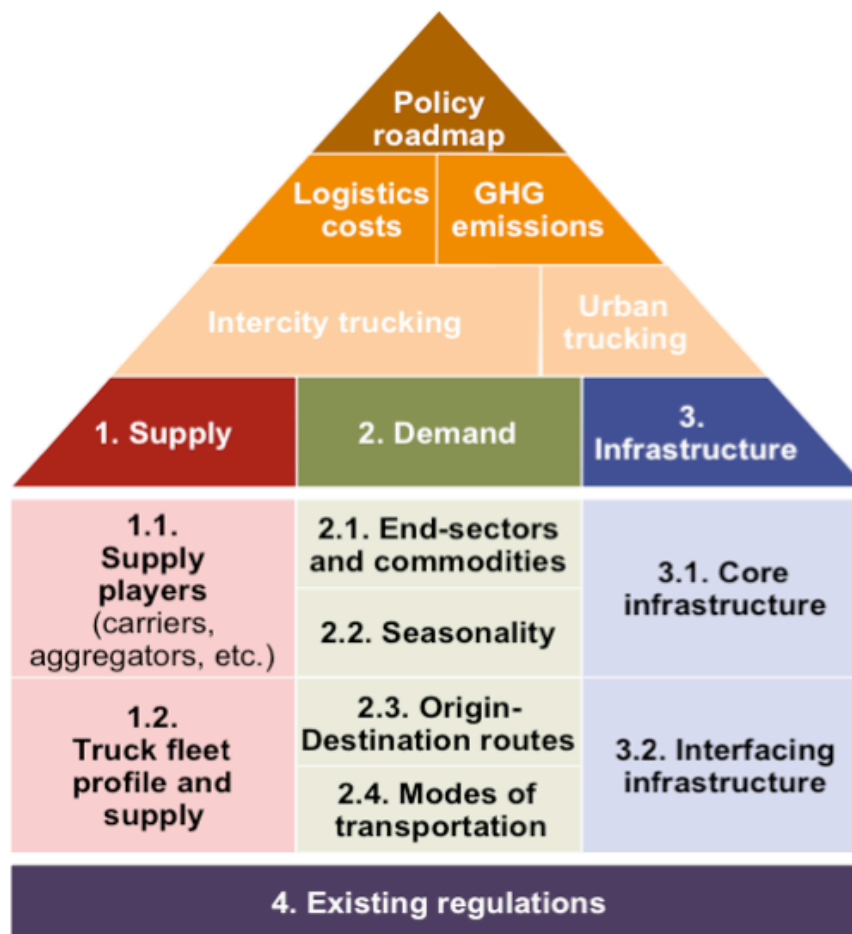
To arrive at the final policy roadmap for the trucking sector, the study conducted a deep-dive operational assessment of the intercity trucking as well as urban trucking, to understand the value chain of the road freight transportation and identify the key challenges. Chapter 2 covers this operational assessment in detail, which includes an understanding of the supply market, demand assessment, and the current infrastructural and regulatory enablers supporting the trucking industry. For the demand assessment, the study built a ground up origin-destination (OD) model for key cities in Vietnam. The OD model gives the traffic flows at a commodity level on major routes in the country. Chapter 2 also details focused case studies of two major metropolitan gateways, Hanoi and Ho Chi Minh City (HCMC), to understand trucking operations within a city.

Chapter 3 covers an in-depth analysis of the logistics costs by developing a cost model at the firm level for truck operators. The model builds on the various focused in-depth interviews as well as the nationwide trucking survey to highlight the key cost drivers for transportation companies.

Further, the GHG model developed and discussed in Chapter 4 uses the OD model truck flows to estimate the GHG emission levels in the country and understand the key parameters influencing emissions.

These chapters lay the foundation for the policy roadmap in Chapter 5, which builds on the key issues highlighted from the previous chapters. The chapter identifies key levers in lowering GHG emissions, along with firm level logistics costs, which are then translated and linked to the final industry policy roadmap.

Figure 1.4. Comprehensive Framework to Assess the Trucking Sector in Vietnam



Summary

- The logistics industry is integral to the economic development in Vietnam, leading to increased trade competitiveness and higher production and consumption levels.
- Roads form the backbone of freight transportation in Vietnam, accounting for 77 percent of the freight volume transported in the country. In 2016, Vietnam’s national logistics costs totaled an estimated 21 percent of its GDP. Transportation costs account for approximately 60 percent of the total logistics costs in Vietnam.
- Further, the trucking sector contributes to nearly 4 percent of the country’s emissions, while transport sector contributes about 10 percent.
- This study takes a first-ever comprehensive look at the trucking sector to define policies aimed at improving the efficiency of the sector and reducing logistics costs and GHG emissions contributed by the trucking industry.

- The study encapsulates the findings of a nationwide trucking survey with more than 1,400 truck drivers across the country, more than 150 companies from the industry, and focused interviews with public and private stakeholders directly related to the sector.
- The study built three original, ground-up models to estimate the key intercity trucking flows on a commodity level across the country, the key drivers of costs for truck operators, and key drivers of GHG emissions of the truck fleet in Vietnam.
- Chapter 2 details a comprehensive operational assessment of the trucking sector. Chapters 3 and 4 examine the key drivers of logistics costs and GHG emissions, based on the respective models. Chapter 5 proposes policy options, to strengthen the trucking sector, to reduce costs and emissions.

Note

1. According to the General Statistics Office of Vietnam:
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Chapter 2: Operational Assessment

The trucking sector serves as the backbone of freight transportation in Vietnam with nearly 77 percent of freight transported by roads. This study assesses the structure and operations of the truck industry, drawing insights from the supply side (transportation companies, truck fleet, and drivers), demand side (shippers and commodity flows), current infrastructure supporting the trucking industry, and existing regulations impacting the trucking sector. The key challenges in each of these areas have been identified and used to propose policy recommendations. This chapter explains the road transportation value chain in Vietnam and the key stakeholders in that value chain, and provides an operational assessment of these stakeholders.

This chapter also explores various factors influencing the efficiency and emissions of intercity and urban trucking. Intercity trucking involves haulage of freight from one city to another, typically for distances more than 200 km. Urban trucking serves first- and last-mile logistics needs, handling the drayage of containers/goods from ports to the nearest industrial hinterland. In Vietnam, trucking companies generally specialize in only one of the two modes of trucking. However, an efficient road logistics network requires close links between intercity and urban trucking to facilitate seamless handover at consolidation centers and paired scheduling as well as matching supply and demand.

Intercity Trucking

Supply factors

The supply side includes two important constituents: the different types of transportation companies (or the supply players in the market), and the supply of truck fleets into the market through original equipment manufacturers (OEMs), distributors, and dealers. This section discusses the structure and operations in the supply side of the trucking industry.

i. Supply players

As illustrated in figure 2.1, the road logistics value chain includes four stakeholders. *Carriers* and *aggregators* provide the link between the firms sending goods (*shippers*) and the firms receiving goods (*receivers*). This section covers *carriers* and *aggregators*.

a. Carriers

A carrier refers to an individual or enterprise in the road transportation sector that owns a fleet of trucks. Three types of carriers operate in Vietnam:

- Shippers with private fleets—enterprises that own and transport goods through their own fleets

- Truck operators—individuals or companies whose main business is to provide or operate trucks as a paid service
- Asset-based logistics service providers (3PL)—companies that provide several logistics services including delivering road logistics services through their owned fleets

Company size

The set-up of a trucking business is regulated under the Decree No. 86/2014/ND-CP. With no restrictions on the minimum capital requirement for setting up a business, Vietnam has experienced an increase in small and medium enterprises that own a small number of trucks as well as owner-operators who drive a single truck. This fragmentation is seen across regions in Vietnam, with an average ownership of around five trucks per company (figure 2.2).

Trucking activity is concentrated in the Red River Delta and Southeast regions, which respectively cover Hanoi and Ho Chi Minh City (HCMC). These two regions boast the highest numbers of truck transportation companies and registered trucks (figure 2.3).

Figure 2.1. Value Chain in the Road Freight Transport and Roles of Each Player

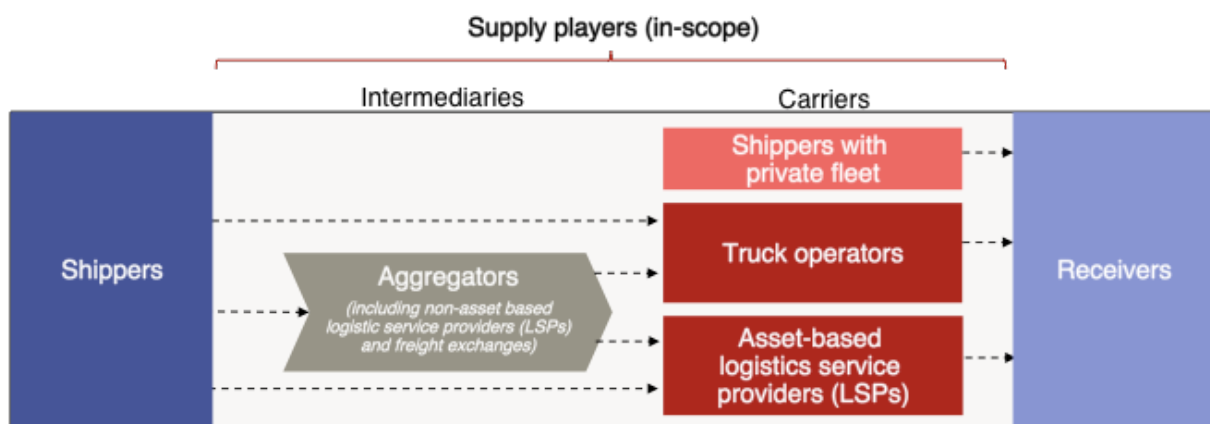


Figure 2.2. Fragmentation of Region-Level Trucking Activity

Region	Number of trucks per company
Northwest	1.9
Northeast	2.6
Red River Delta^a	3.4
North Central Coast	5.8
South Central Coast	4.4
Central Highlands	12.8
Southeast^a	9.8
Mekong River Delta ^a	16.3
Vietnam Average	5.3

Source: Unpublished data provided by the Directorate for Roads of Vietnam (DRVN).

Note: Data for >1T trucks and truck companies until March 2018

a. Major economic hub

Figure 2.3. Region-Level Trucking Activity, by Company Size

Region	Number of >1T trucks ^a	Number of >1T truck companies ^b
Northwest	1,834	957
Northeast	14,117	5,368
Red River Delta^c	58,636	17,325
North Central Coast	14,607	2,534
South Central Coast	21,793	4,958
Central Highlands	10,610	826
Southeast^c	68,479	6,976
Mekong River Delta ^c	26,127	1,604
Total	432,406	81,096

Source: Unpublished data provided by DRVN.

Note: Data for >1T trucks and truck companies until March 2018

a. Number of trucks with gross vehicle weight (GVW) >1T

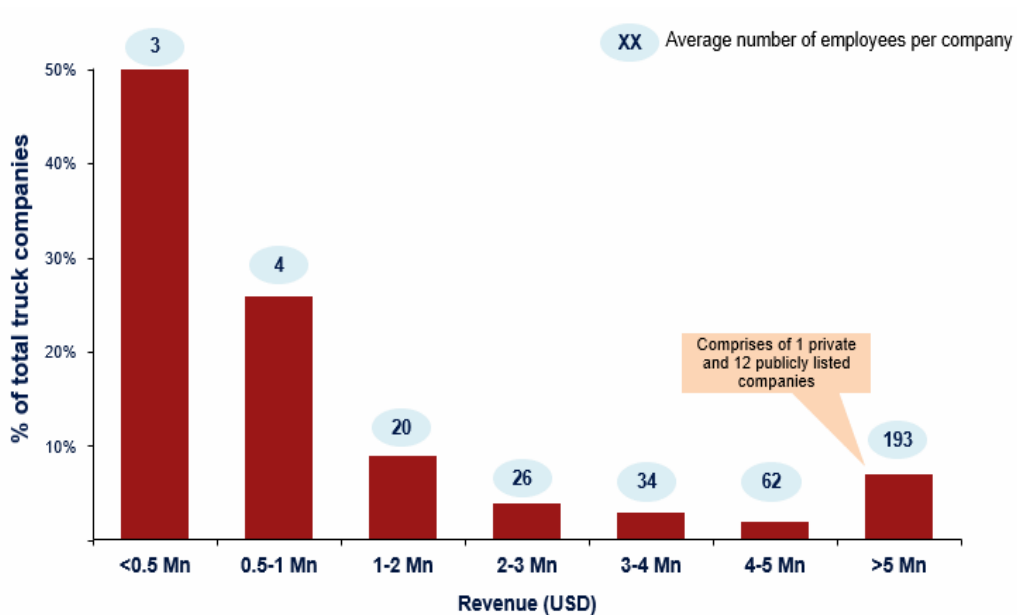
b. Companies owning trucks with GVW >1T

c. Major economic hub

A large proportion of low revenue trucking companies operate in Vietnam, with about 50 percent of companies generating less than US\$500,000 in revenue, as shown in figure 2.4.¹ In addition to leading to heavy and unsustainable competition, this fragmentation and the lack of scale hamper service quality and operations efficiency.

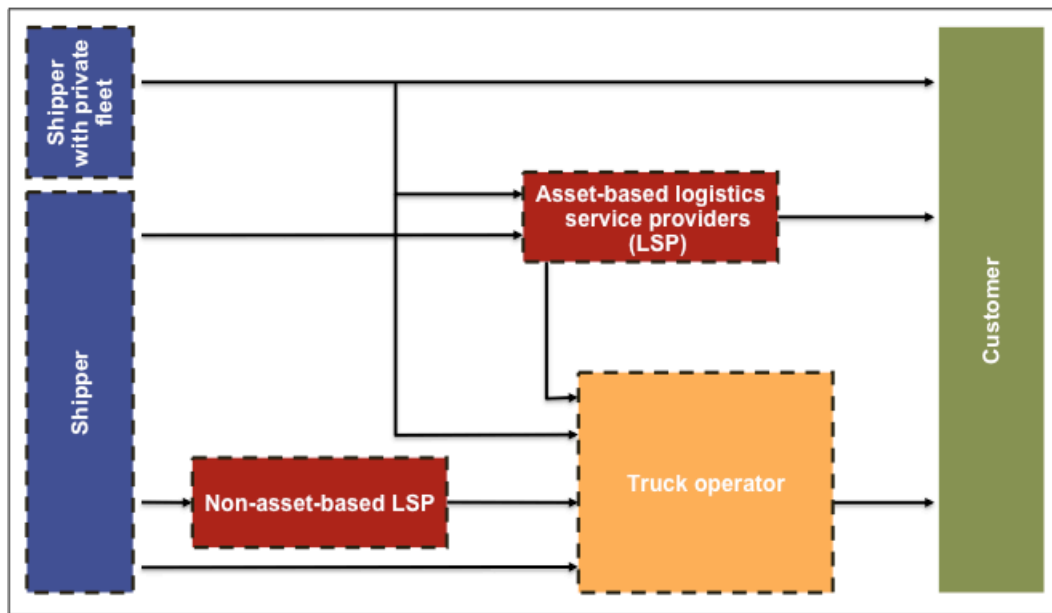
To understand the operational circumstances faced by these companies, a national trucking survey of more than 150 companies identified key fleet characteristics, operational metrics, financing and other costs, and regulatory views for various carriers, including logistics service providers, shippers, and truck operators. Truck operators comprise approximately 70 percent of respondents, reflective of the distribution of different types of carriers in the trucking market. The characteristics of these carriers (figure 2.5) are summarized in the following section.

Figure 2.4. Distribution of Trucking Companies, by Revenue



Source: Avention, 2018 data.

Figure 2.5. Respondents in Nationwide Trucking Survey



Note: Dotted boxes indicate the players interviewed for the survey.

Fleet characteristics

The survey results indicate that logistics service providers (LSPs) have larger fleets, with the number of trucks owned or leased nearly double those of truck operators. Since LSPs are larger in scale and breadth of services, they typically have newer truck fleets compared to the other two types of carriers. Higher cash reserves and better access to financing lowers the proportion of second-hand trucks owned by LSPs to 20 percent, compared to truck operators, where 65 percent of fleets are second-hand trucks.

Operations

Backhaul rates are high across carriers in Vietnam, driven by a lack of freight consolidation centers as well as limited demand aggregation and information flow to carriers. Empty backhaul rates are higher for truck operators (up to 70 percent at times) and lower for LSPs and shippers (up to 50 percent at times). LSPs and shippers typically have a more stable source of demand through long-term contracts and can optimize their trips through planning. Truck operators, however, have limited long-term contracts and therefore tend to have higher empty backhauls. Chapter 3 provides further details of the operational efficiency of trucks and utilizations rates.

Regulatory influence

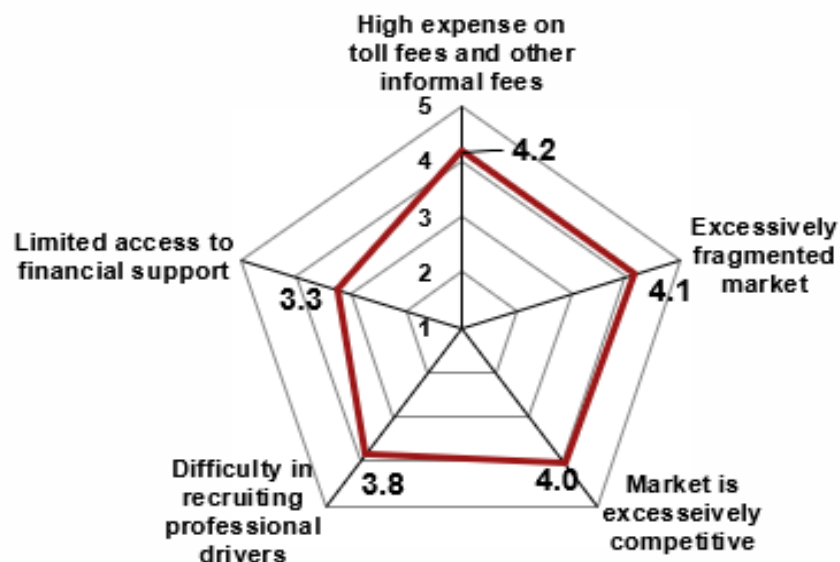
For the road-trucking sector, a key perceived challenge is the high cost of tolls and informal road fees (figure 2.6). To avoid these expenses, truck drivers often use the district roads to bypass the tolls on highways. The fragmentation of supply represents another challenge faced by the industry, leading to intense price competition and low unsustainable margins. Carriers do not consider access to financial support as a major challenge, since vehicle loans are available at standard industry rates of 10 percent. However, such higher-interest loans are accessed mostly when companies need to replace aging vehicles.

When asked about the views on existing regulations, survey respondents chose truck driver licensing as the policy with the highest positive perceived impact (figure 2.7). Other policies with a high positive perceived impact include load limitation, speed limitation, and maximum hours of continuous service for the drivers, indicating that the industry welcomes policies aimed at providing better safety of truck drivers, and highlighting safety in future policy making.

The survey elicited views of the various carriers—LSPs, shippers, and truck operators—on potential future policies designed to improve the efficiency and competitiveness of the trucking sector (figure 2.8). Three top policy areas emerged from the analysis of survey responses:

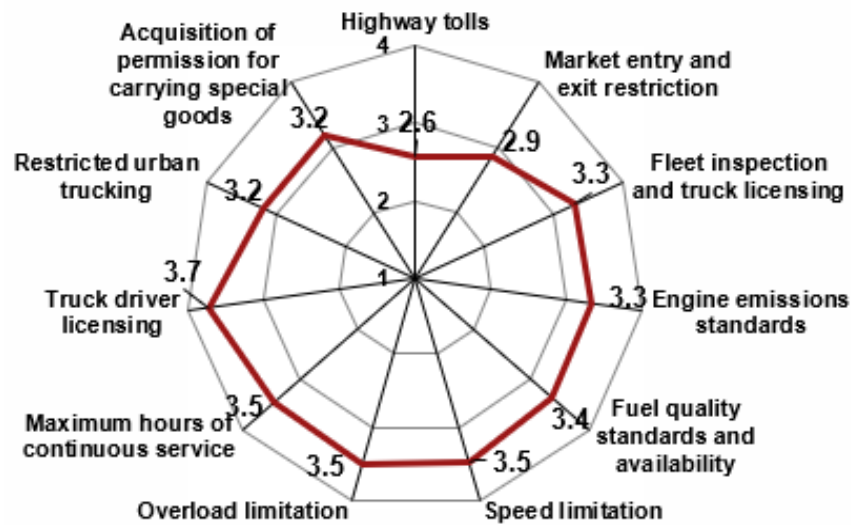
1. **Road and truck infrastructure facilities:** upgradation of highways, trucking lanes, etc.
2. **Seamless movement of goods across borders:** simplified documentation and e-tolling
3. **Fleet modernization:** access to new and modern trucks for better efficiency

Figure 2.6. Industry Views: Key Perceived Challenges



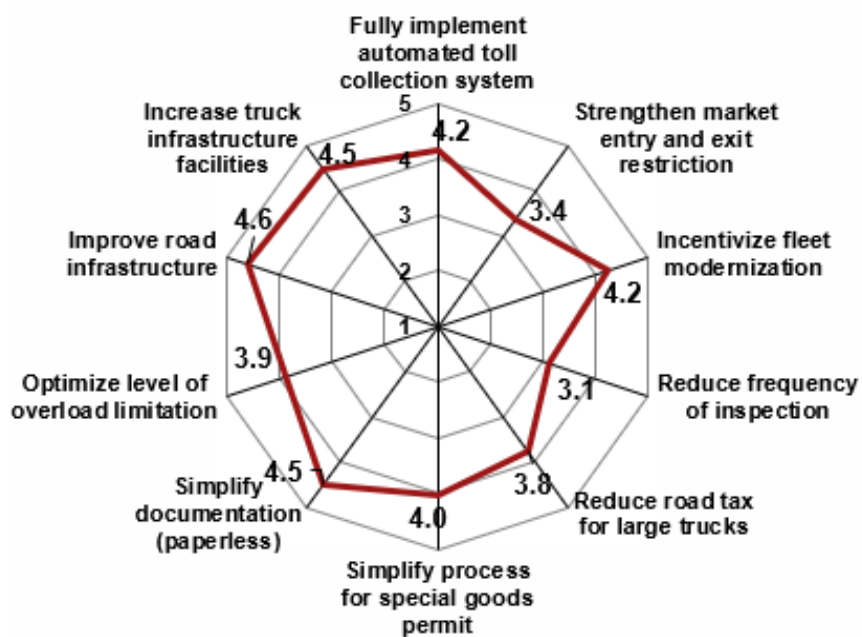
Note: Opinions taken on a scale of 1 = Strongly Disagree to 5 = Strongly Agree

Figure 2.7. Industry Views: Perceived Impact of Existing Regulations



Note: Opinions taken on a scale of 1 = Highly negative impact to 5 = Highly positive impact

Figure 2.8. Industry Views: Opinion on Future Policies



Note: Opinions taken on a scale of 1 = Strongly Disagree to 5 = Strongly Agree

b. Aggregators

Given the fragmentation of the supply base, the market between the shippers and the truck owners exhibits an expected asymmetry, or gap, in information. Typically, aggregators play a key role in filling this information gap by connecting the demand side (shippers) and supply side (truck owners) to facilitate transportation activities. These aggregators can operate through the following business models:

- **Contract-based commission:** The intermediary does not own assets and may offer various logistics services to shippers while outsourcing the transportation itself to truck operators or asset-based LSPs, guaranteeing the service. In Vietnam, these indirect players mostly operate only regionally or locally and work on a commission-level basis—ranging from 7 to 10 percent—depending on the contract value. The demand-supply match is usually done through personal contacts. The non-asset-based logistics service providers can offer a variety of services, while a physical broker or agent primarily serves as the middleman only.
- **Freight marketplace:** The indirect player uses technology applications for instant online bookings and transactions to provide algorithmic real-time, supply-demand matching. The player charges the customer a transaction service fee.
- **Freight exchange or load boards:** The intermediary player provides subscription-based online services for haulage companies, LSPs, freight forwarders, and transport companies to transact business. The online service is usually a website portal or an online listing platform where transportation companies can post fleet information and availability, allowing shippers to book with a company based on their preferences. Users complete subsequent transactions offline; the load board owner earns income through a subscription model.

A few on-demand service providers have emerged in Vietnam in recent years. However, only a limited number of vehicle owners, shippers, and assisting transport service providers have subscribed, resulting in low rates of active participants, registered freight volume, and successful transactions on the platforms. The volume share of freight transported through these on-demand platforms was less than 1 percent of the market in 2017 (Biinform 2017). Based on primary and published interviews with start-up founders, the key challenges faced by these disruptive logistics start-ups include the following:²

- Inaccurate data on the platforms and frequent downtime, which deters shippers from using the portal
- Insufficient data sources on road conditions and time restrictions on road access, which restricts users' ability to determine correct rates for freight transportation
- Low acceptance levels from shippers and truck owners, who prefer trading through face-to-face meetings or over the phone, rather than posting or clicking on web boards

- Transactions not converting to actual service; for example, VinaTrucking, the first Vietnam Transport Trading Floor, logged 225 transactions in 2016, but only 40 of those successfully converted into service contracts (Vietnam News 2016)
- Time-consuming registration procedures could lead to a small number of registered members and successful transactions.
- Lack of standardization in prices charged by truck drivers for different goods in different areas

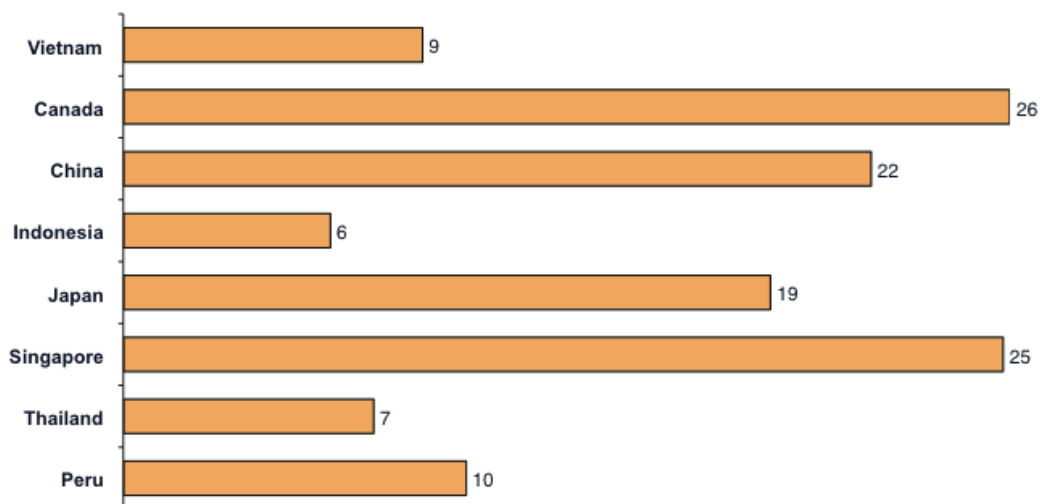
The development of aggregators in fragmented markets, such as Vietnam, can fundamentally change the efficiency of inter- and intra-city trucking through better pan-Vietnam coverage, matching of supply to demand, and greater transparency. Emerging companies like VinaTrucking and EcoTruck are following the freight exchange model, while start-up Ahamove has looked to disrupt prevalent business models through its marketplace model. Chapter 5 discusses in detail the policy reforms aimed at tackling the growth of aggregators—including scaling up of the existing brokers in Vietnam as well as promoting other digital models of aggregation.

c. Workforce characteristics and female participation

According to the 2011 labor force survey conducted by General Statistics Office of Vietnam, transportation and storage accounts for 5.5 percent of the total employed population in urban areas. However, the sector witnesses one of the lowest levels of female representation, with only 9.3 percent participation of women in the total sector workforce (figure 2.9).

Figure 2.9. Global Benchmark of Female Representation in Transportation Sector

Percentage of participation



Source: Nathan, Inc. 2015.

The key issues associated with the lower percentage of female workforce in the transportation sector include the following:

- The perception that industry jobs are physically arduous, remote, and demanding, with over 10 hours of work required per day, which has deterred women from applying
- The low number of women serving in leadership positions has resulted in a lack of role models to encourage female participation in the workforce
- A lack of awareness of transportation as a career option for women, largely due to the pre-conceived stereotypes of male sector workers
- The approximate 5 percent wage gap between men and women

Initiatives across four key areas could help increase female representation in the transportation sector:

1. **Education:** Create awareness of transportation professions at tertiary education levels through expert talks and increase female participation in non-traditional vocational programs by providing incentives—for example, reduced fees.
2. **Recruitment:** Provide fair job opportunities to women via state-supported recruitment fairs organized to channel hiring of women in specific roles, such as transportation planning, etc. In addition, give government recognition to firms having high gender ratios.
3. **Retention:** Encourage government stipulated policies in favor of working women, such as paid maternity leave, child care facilities, and maternity insurance coverage.
4. **Mentorship:** Encourage government-sponsored women’s leadership seminars to facilitate networking of women at senior management positions.

ii. **Truck fleet profile and supply**

The characteristics of the truck fleet in a country are defined by two key parameters, namely the age of the fleet and the carrying capacity of the fleet. To understand the root causes of fleet mix and fleet age in Vietnam, the original sources of these trucks—for example, imported or domestically manufactured and major supplying OEMs—also need to be identified and analyzed.

The key characteristics of the Vietnam fleet are as follows:

1. **Skewed towards trucks with lower carrying capacity**—A higher number of trucks required per ton of freight results in higher costs and emissions
2. **Skewed towards old trucks**—Older vehicles are less efficient and eco-friendly
3. **Low domestic production and dependency on imports**—Resulting in delayed technology adoption and domestic innovation, with operational challenges in spare parts and service levels

Fleet mix

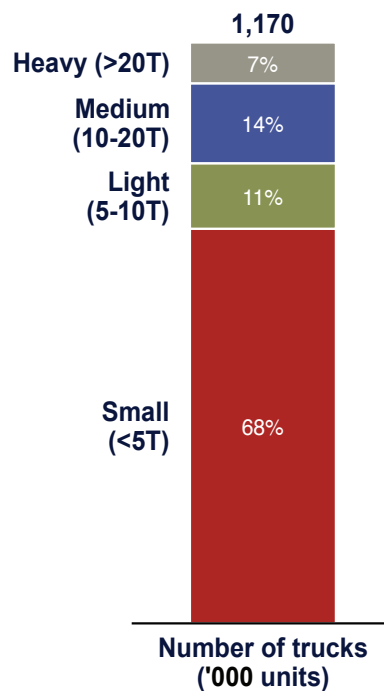
The fleet mix in Vietnam has been defined based on the carrying capacity of trucks under use. A higher proportion of smaller capacity trucks operate in Vietnam. As of 2018, approximately 1.1 million trucks have been officially registered in Vietnam (figure 2.10). Of these, 68 percent have a Gross Vehicle Weight (GVW) of less than 5 tons, 11 percent are between 5 and 10 tons, 14 percent are between 10 and 20 tons, and 7 percent are heavy trucks with a GVW of more than 20 tons.³

Developed countries with strong roadway networks (United States, Germany) are more reliant on heavy trucks for freight movement. Compared to other ASEAN peers (e.g., Malaysia and Thailand) and Asian peers (e.g., China and India), Vietnam also has a relatively higher proportion of small-sized trucks, according to annual sales statistics (figure 2.11).

The low proportion of heavy trucks sold in Vietnam leads to a requirement of a higher number of trucks to move the same quantity of freight. This, in turn, leads to higher congestion, costs, and emissions.

Figure 2.10. Number of Trucks in Vietnam, 2018

In '000 units

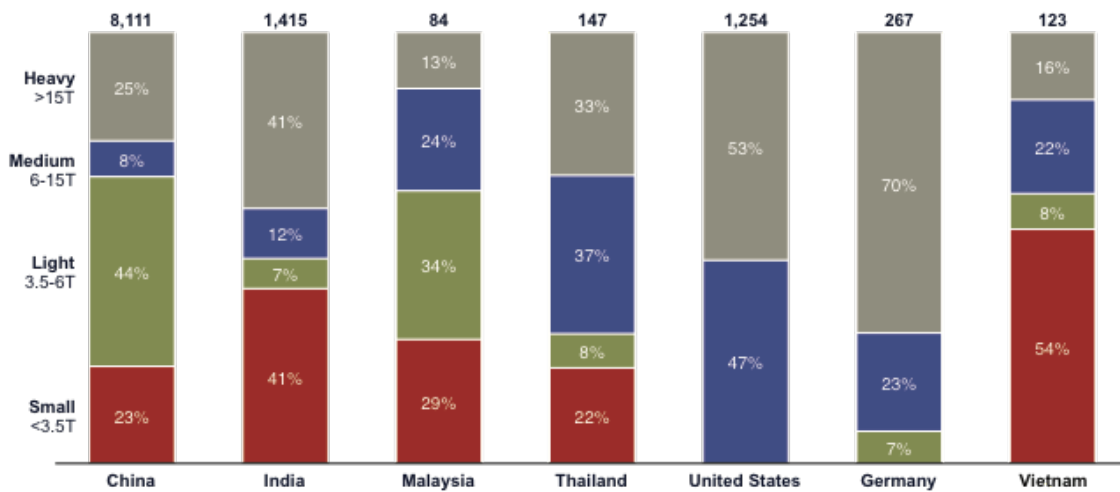


Source: Unpublished data provided by Vietnam Register

Note: Truck fleet includes trucks, tractors, trailers, and semi-trailers

Figure 2.11. Annual Truck Sales in Vietnam versus Peers, 2014–2016

In '000 units, percentage of total



Source: IHS Markit; data for 2018 accessed via a database available to IHS Markit clients.

Fleet age

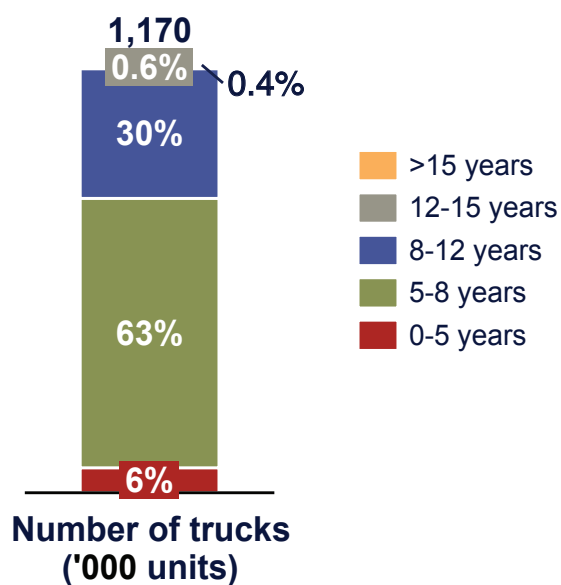
The average age of the fleet in Vietnam is 7.5 years. As shown in figure 2.12, 94 percent of the truck fleet is more than five years old, with a large proportion lying in the 8 to 12 years age category. Developed countries, such as Germany and the UK, have a much higher proportion of trucks in the zero to five years age category—nearly 41 percent and 37 percent respectively.⁴ The older fleet leads to higher logistics costs and GHG emissions, driven by higher total cost of operations and decreased fuel efficiency, making a younger, more efficient fleet more desirable. As figure 2.12 also illustrates, Vietnam could potentially target a required fleet modernization of trucks older than eight years.

Imported fleet

Imported trucks account for more than 30 percent of all trucks sales in Vietnam. A key reason is the low production capacity of major OEMs in Vietnam compared to ASEAN peers, such as Thailand, Indonesia, and Malaysia, due in part to the comparatively late opening of the automobile sector in Vietnam (table 2.1).

Figure 2.12. Distribution of Truck Fleet in Vietnam by Age, 2018

In '000 units



Source: Unpublished data provided by Vietnam Register

Note: Truck fleet includes trucks, tractors, trailers, and semi-trailers

Table 2.1. Automobile Production Capacity of OEMs in ASEAN, 2014

In '000 units

OEM	Vietnam	Indonesia	Thailand	Malaysia
Suzuki	5	200	100	30
Isuzu	5	52	346	12
Toyota	35	256	770	80

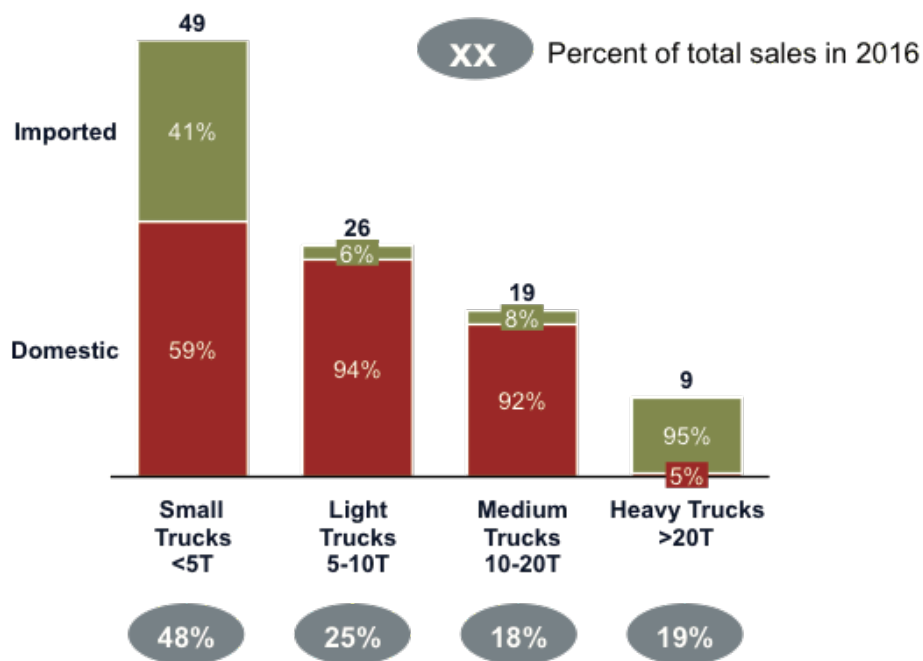
Source: Economic Research Institute for ASEAN and East Asia (ERIA): <http://www.eria.org>.

Note: Includes production of all automobiles

For building lighter trucks, OEMs typically prefer completely knocked down (CKD) imports, where they import the parts and assemble vehicles in Vietnam. However, for heavy trucks, OEMs prefer to import completely built up (CBU) units—importing the entire truck as a complete unit. These import preferences stem from the low CKD tariffs for lighter trucks and low CBU tariffs for heavier trucks. Annual sales figures support these preferences; as shown in figure 2.13, import activity dominates the heavy truck segment, and also claims a large share of the small truck segment.

Figure 2.13. Annual Truck Sales in Vietnam, by Tonnage

In '000 units, percentage of total



Source: Unpublished data provided by Vietnam Automobile Manufacturers Association (VAMA); United Nations Comtrade Database: <https://comtrade.un.org/>.

Vietnam’s significant dependence on imported trucks brings associated challenges, for instance:

- The profile and type of trucks have not been customized for Vietnam’s needs, with models imported from the global portfolio of truck OEMs.
- Because Vietnam lags behind the usual countries of origin (e.g., China and Japan) on emission norms, only older generation truck models can be imported.
- Limited on-ground presence of foreign truck OEMs has resulted in insufficient coverage of original spares and after-sales support (Saigon Online 2016).

Regulations, effective January 1, 2018, have tightened import regulations to ensure the quality of all automobiles. For example, vehicle type approvals (VTA) must be issued for each vehicle by authorities of the exporting countries. Without the VTA the importer must provide a separate certificate of quality, technical safety, and environmental protection of the automobile or engine, along with

various other documents. Such tightened import regulations could address low localization rates and spur domestic production capabilities as well as modify vehicle features and specifications to Vietnam's needs.

Original equipment manufacturers in Vietnam

OEMs are the original producers of the truck body, along with its parts and other supporting equipment. In Vietnam, domestic OEMs have limited capabilities to completely manufacture whole trucks due to a limited manufacturing presence and supply ecosystem. Most trucks sold in the country are assembled from imported parts (known as completely knocked down, or CKD) or imported as a complete unit (known as completely built up, or CBU). Reliance on imported parts for vehicle production in Vietnam (nearly 60 to 80 percent of components are imported) results in costs around 20 percent higher than vehicles produced in other ASEAN countries (Dezan Shira & Associates 2017). The recent elimination of tariffs on CBUs imported from ASEAN member countries has further boosted the trend toward vehicle importation. Lower import tariffs on ASEAN-produced vehicles could have also increased the accessibility of new trucks in Vietnam, from a financial perspective.

OEMs from Japan (e.g., Isuzu, Suzuki, and Hino), China (Foton) and the Korea (Hyundai) have started to manufacture locally in partnership with domestic companies. OEMs, such as Hyundai and Foton, have achieved this through partnerships with THACO, Vietnam's leading automobile manufacturer and distributor. Others, such as Isuzu, Suzuki, and Hino, have expanded into the Vietnam automobile market through joint ventures or subsidiaries. Though these units handle domestic assembly of trucks, they do not usually venture into component manufacturing.

Two key Vietnamese domestic truck assemblers and producers, THACO and VEAM, have formed partnerships with Hyundai, Foton, and Maz, among others, enabling technology exchange and enhanced manufacturing ability. However, most of the current capability is limited to simple component manufacturing and final assembly of new and used trucks (Schröder 2017).

Demand factors

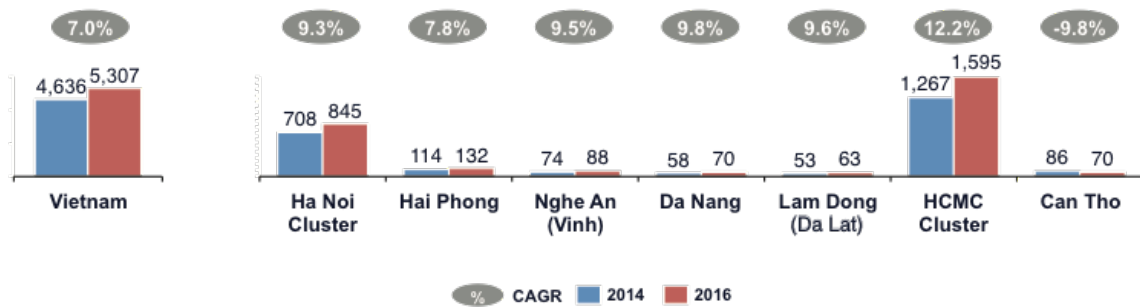
It is important to analyze the current freight flows at the commodity and route level to better predict the future road freight demand. This section describes a ground-up model built to analyze the commodity flows in the country. The study created an origin–destination (OD) commodity freight flow model for intercity movement to help understand the key routes for road freight transportation at present and in the future, which will facilitate the proposal of more effective policies and infrastructure interventions. Further, the section on seasonality, later in this chapter discusses the element of seasonality, which must be considered while analyzing the commodity flows in the country.

For this OD model, seven key economic cities: Hanoi, Hai Phong, Vinh, Da Nang, Da Lat, HCMC, and Can Tho have been selected based on their GDP, population, and growth trends in inbound and outbound freight movement. Together, these seven cities contribute to 54 percent of the total GDP for Vietnam (figure 2.14) and 37 percent of the country's total population (figure 2.15).

In addition, these seven cities show a high dependence on roads for intercity movement of goods, with some modal share of inland waterway transport (IWT) in the delta regions, resulting in 42 OD flows in the model (figure 2.16).

Figure 2.14. Gross Output in Vietnam and Key Cities

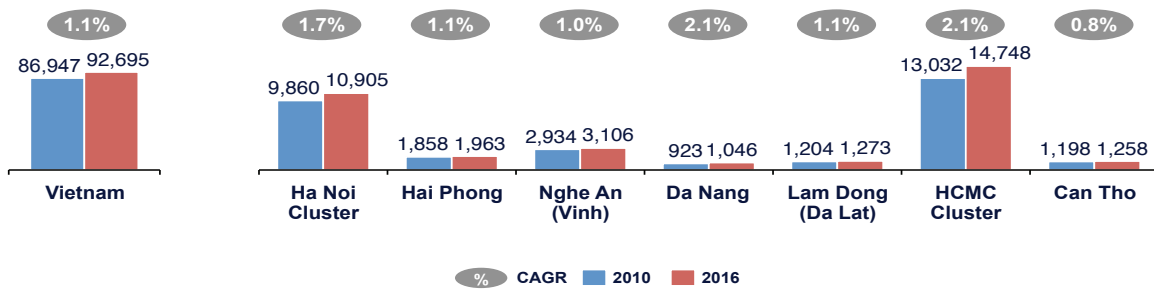
In trillion VND, 2014 and 2016



Source: General Statistics Office of Vietnam: https://www.gso.gov.vn/Default_en.aspx?tabid=766.

Figure 2.15. Average Population in Vietnam and Key Cities

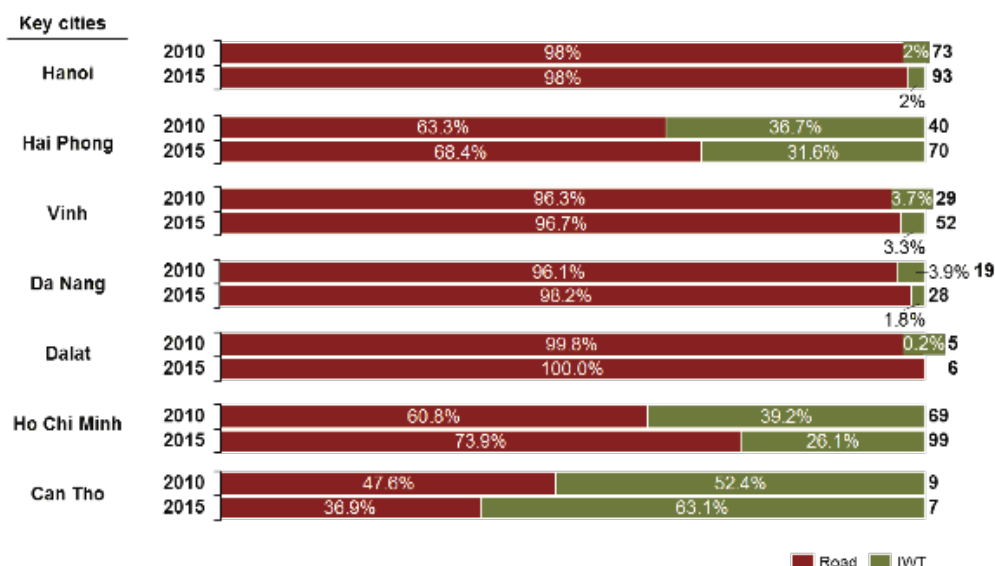
In '000 units, 2010 and 2016



Source: General Statistics Office of Vietnam: https://www.gso.gov.vn/Default_en.aspx?tabid=766.

Figure 2.16. Freight Volume Carried In and Out of Provinces by Road and IWT

In million tons, 2010 and 2015



Source: General Statistics Office of Vietnam: https://www.gso.gov.vn/Default_en.aspx?tabid=766.

Note: Based on data contribution from other modes, the share of airways and railways is less than 0.1 percent

i. Origin–destination model: Methodology

To generate the OD matrix at the national level, the study analyzed the data of active trucks in each province received from the Directorate for Roads of Vietnam (DRVN) to define the sampling necessary for conducting truck driver surveys. The provincial data provides the active truck fleet registered in a province. Interviews were conducted with approximately 1,400 truck drivers in these key cities to determine the origins and destinations of their journeys, along with volumes and types of commodities being transported. Researchers then compiled this information to obtain the OD matrix sample.

To apportion flows for the 42 key OD pairs researchers used a 10-day data of traffic flow collected by the commercial vehicle tracking system (CVTS) in 2017—shared by the DRVN. The CVTS data was used to calibrate the model by determining the traffic density on different routes. For routes merging at a counting station, the CVTS data provided the probability of usage for an individual route. The DRVN roadside manual flow count collected at stations across Vietnam provided estimates for traffic flows at each station and helped calculate the sampling rate of truck drivers interviewed at each station (figure 2.17). The OD matrix sample, combined with the sampling rate and the probabilities of usage of a given route (using the CVTS data), was used to calculate the estimated OD matrix for the 42 OD pairs.

ii. Origin–destination model: Key results

The OD model estimates nearly 10,000 trucks carry goods everyday between the seven key cities with a freight flow of approximately 111,000 tons per day (figure 2.18), accounting for nearly 40 percent of the overall intercity freight flows in the country (JICA 2010).⁵

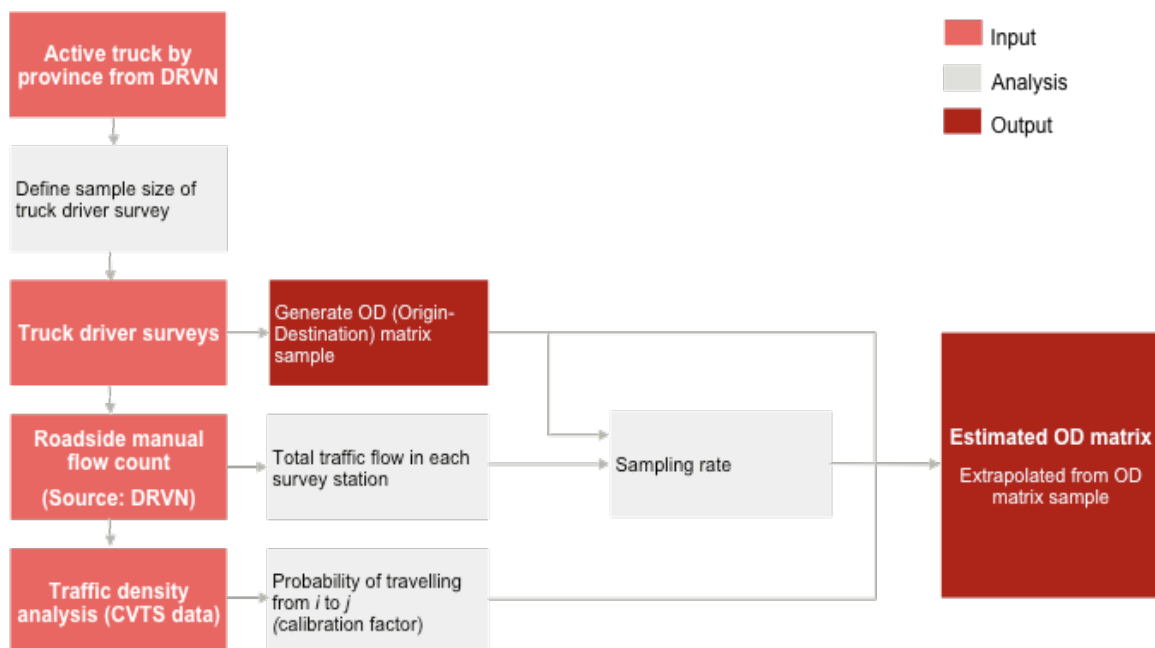
The study model identified HCMC, Da Nang, and Da Lat as the key production centers with net negative volume flows, while Ha Noi, Can Tho, and Vinh serve as the key consumption centers with net positive flows. In addition, the model highlights eight OD routes, which account for 77 percent of the flows in this OD model and 30 percent of the flows at the national level. These eight routes form the priority routes for policy recommendations in further chapters and include the following:

- Hanoi <-> Hai Phong (125 km)
- Hanoi <-> HCMC (1,600 km)
- HCMC <-> Can Tho (200 km)
- HCMC <-> Da Lat (300 km)

Further, at a commodity level, food products and beverages has the highest share of commodity flows, while the rest is fragmented. In general, industrial products account for 79 percent of the flows, while agricultural products make up the remaining 21 percent. Figure 2.19 illustrates the breakup of freight flows at the commodity level.

Hanoi and HCMC also act as transit stops for the export and import commodities from Hai Phong Port and the Mekong Delta region, thereby leading to high density traffic flows in these two major metropolitan gateways. The section on urban trucking will discuss these two cities, providing further insights on urban traffic flows.

Figure 2.17. Methodology for Origin–Destination Matrix



Source: CEL Consulting and A.T. Kearney analysis, conducted as part of the study.

Figure 2.18. Origin-Destination Model Output: Freight Flows for 42 OD Pairs

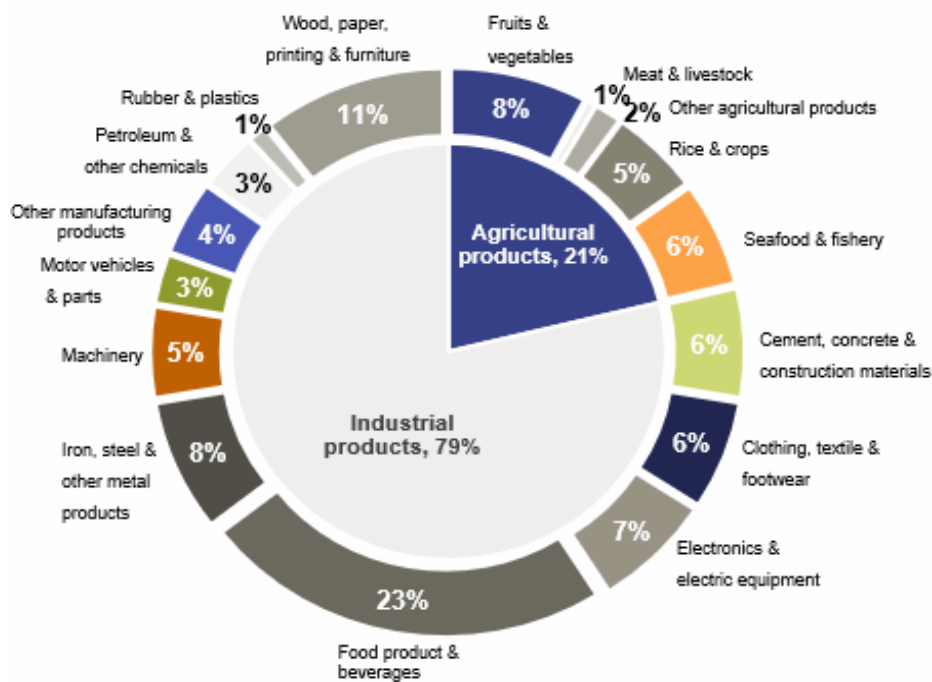
O/D (percent volume/day)	HCMC	Ha Noi	Can Tho	Da Lat	Hai Phong	Da Nang	Vinh	
HCMC		11,329 (10%)	9,200 (8%)	4906 (4%)	1,343 (1%)	2,760 (2%)	1,823 (2%)	31,362 (28%)
Ha Noi	5,475 (5%)		390 (0.4%)	324 (0.3%)	20,889 (19%)	1,179 (1%)	3,438 (3%)	31,695 (28%)
Can Tho	5,927 (5%)	1,218 (1%)		54 (0.05%)	230 (0.2%)		444 (0.4%)	7,823 (7%)
Da Lat	5,395 (5%)	527 (0.5%)	54 (0.05%)			414 (0.4%)	73 (0.1%)	6,463 (6%)
Hai Phong	891 (1%)	23,149 (21%)		32 (0.03%)			160 (0.1%)	24,232 (22%)
Da Nang	2,168 (2%)	1,497 (1%)		107 (0.1%)	964 (1%)		1,035 (1%)	5,772 (5%)
Vinh	1,063 (1%)	1,954 (2%)		89 (0.1%)	816 (1%)	63 (0.1%)		3,985 (4%)
	20,919 (19%)	39,674 (36%)	9,644 (9%)	5,513 (5%)	24,242 (22%)	4,416 (4%)	6,973 (6%)	111,392 (100%)

High flows Low flows

Source: CEL Consulting and A.T. Kearney analysis, conducted as part of the study.

Note: Projected 2017 flows based on JICA 2010, and extrapolated to 2017 values. Intercity routes assumed to be >100km

Figure 2.19. OD Model Output: Commodity-Level Analysis



Source: CEL Consulting and A.T. Kearney analysis, conducted as part of the study.

Given the strong economic growth in Vietnam, the future projected freight flows are expected to rise overall, resulting from increases in production and consumption. The key factors leading to the increase are summarized below:

- Surge in FDI and local investments: Increased investments are expected to generate higher production levels through improvements in technological capabilities and manufacturing techniques.
- Governmental policies supporting productive sectors: The government has been heavily investing in the agricultural and industrial sectors. The government has also signed multiple trade agreements to boost its economy.
- Increasing population and income *per capita*: The increasing population and enhanced disposable incomes are expected to augment household consumption.
- Growth of exporting demand: Competitive labor costs relative to productivity, has made Vietnam an attractive market for exports
- Increasing urbanization: An increase in urbanization has augmented the available workforce for industrial production—which has been growing annually by 1.5 million (Mah 2018)—leading to more human capital for production.

iii. Seasonality

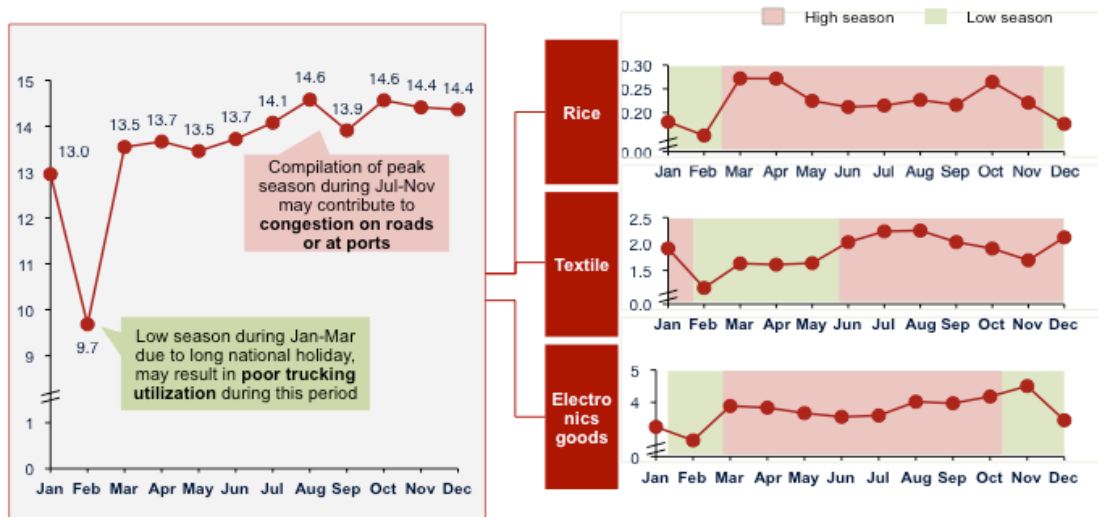
The commodity flows in the OD model are subject to the seasonal nature of the commodities. Seasonality (as represented by the average monthly exports in this study) represents a key trend that if not adequately planned for, will result in supply-demand imbalances and create stress in the road logistics system. Generally, a peak in net exported values occurs in July to November because of high agricultural productivity, with a steep drop in February, due to the Tet holiday in Vietnam when all factories stop operating and economic activity stagnates (figure 2.20).

This seasonality means the demand of transportation fluctuates, while fleet numbers do not face an abrupt increase or reduction within a year, creating fluctuating periods of overdemand and oversupply. The existence of high and low seasons for each commodity presents an opportunity for the aggregator to consolidate demand and match it with the supply, to provide an appropriate spot pricing system. Consolidation of demand and information flows through an aggregator reduces the effect of oversupplying, which causes pricing wars and reductions in service quality.

When considering each commodity individually, diverse trends emerge. Agricultural products have a similar low season from January to February, and a high season in the middle of the year. This seasonality in Vietnam, especially for rice, is primarily dependent on the rainy season. The country’s rainy season occurs during the south monsoon season (May to September), with high levels of rainfall and more precipitation along the east coast—in Da Nang, for instance—followed by a dry season with a low level of precipitation during December to February (figure 2.21).

Manufactured goods also have seasonal movements. Historical statistics reveal that the textile sector has less export demand during the summer period. Electronics goods reflect stable demand all year round, with a dip during the year-end and year-beginning. The dip is generally seen after the seasonal holidays, which is reflective of consumer behavior. In the first quarter, high demand for cement is due to the adequate weather conditions for the transportation and storage of cement and related products. The diverse patterns of various products emphasize the need for more pan-Vietnam aggregators to avoid trucking demand-supply mismatches (figure 2.22).

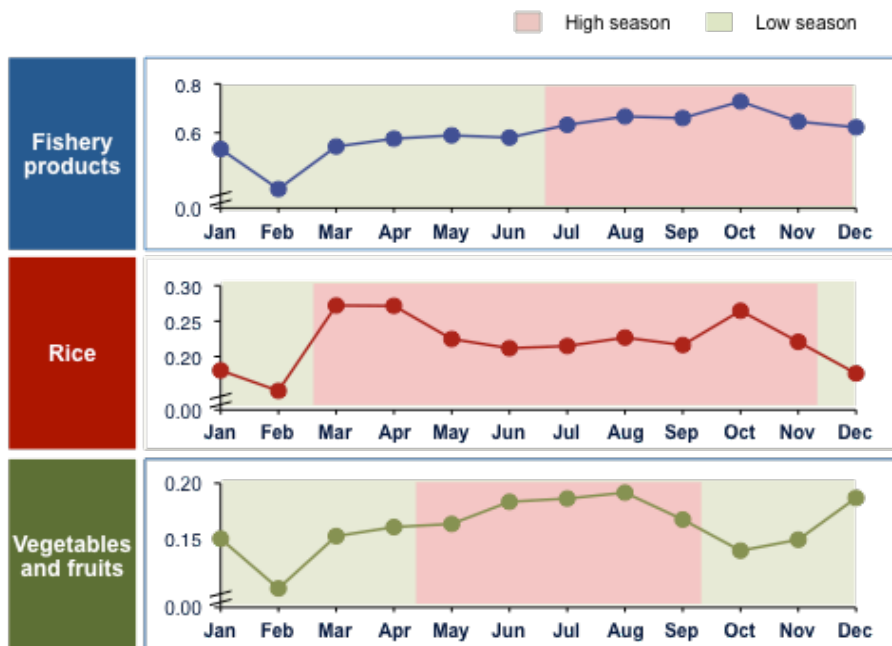
Figure 2.20. Exported Value of Selected Commodities, Aggregated Monthly
In billion USD, averaged value from 2014 to 2016



Source: General Statistics Office of Vietnam: https://www.gso.gov.vn/Default_en.aspx?tabid=766.

Figure 2.21. Exported Value of Agricultural Products, Averaged Monthly

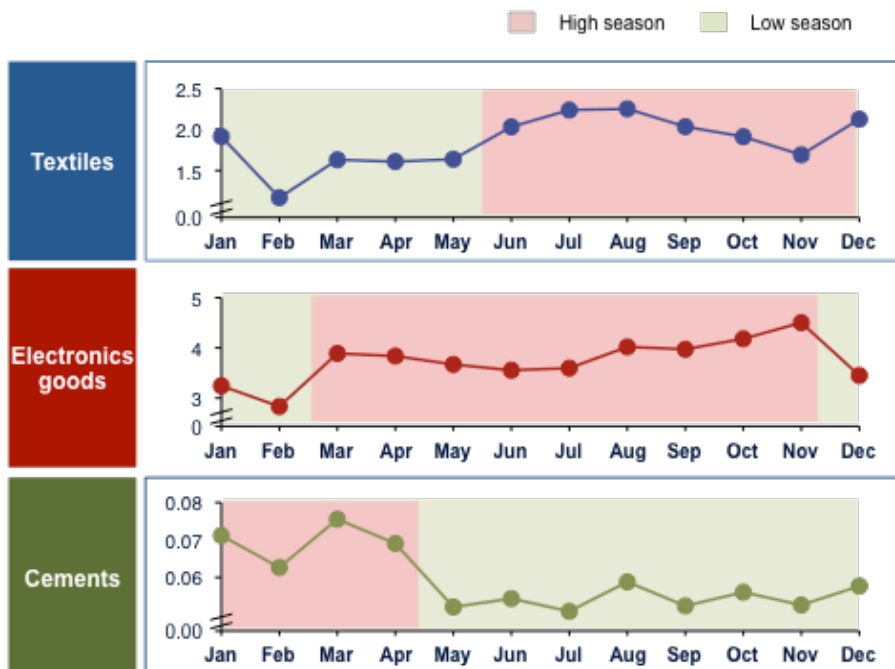
In billion USD, averaged value from 2014 to 2016



Source: General Statistics Office of Vietnam: https://www.gso.gov.vn/Default_en.aspx?tabid=766.

Figure 2.22. Exported Value of Manufactured Products, Averaged Monthly

In billion USD, averaged value from 2014 to 2016



Source: General Statistics Office of Vietnam: https://www.gso.gov.vn/Default_en.aspx?tabid=766.

Infrastructure related to road freight

Infrastructure plays an important role in determining the cost and efficiency of road logistics. To operate their daily business, truck operators in Vietnam rely on road infrastructure and other infrastructure-related road logistics (e.g., inland container depots or ICDs), and interface infrastructure with other transport modes. Therefore, understanding the situation and challenges from the perspective of the trucking sector will help in addressing gaps between current and future scenarios, and assist in creating effective policy interventions to strengthen the sector.

i. Road infrastructure

Vietnam boasts an extensive road network density. However, more than 50 percent of these roads are commune or rural roads. National highways and expressways, crucial for freight movement, account for only 7 percent of the total roads networks. Vietnam's highway and expressway density (km/sq. km) is low compared to its international peers, indicating the need to expand the country's highway and expressway network (table 2.2).

Due to its high percentage of unpaved roads (nearly 25 percent as of 2013, according to Central Intelligence Agency data⁶), poor maintenance, and construction quality, Vietnam also ranks low in the *Global Competitiveness Index on Road Quality*, released by the World Economic Forum (figure 2.23).

Table 2.2. Comparative Analysis of Road Density: Expressway vs. Highway

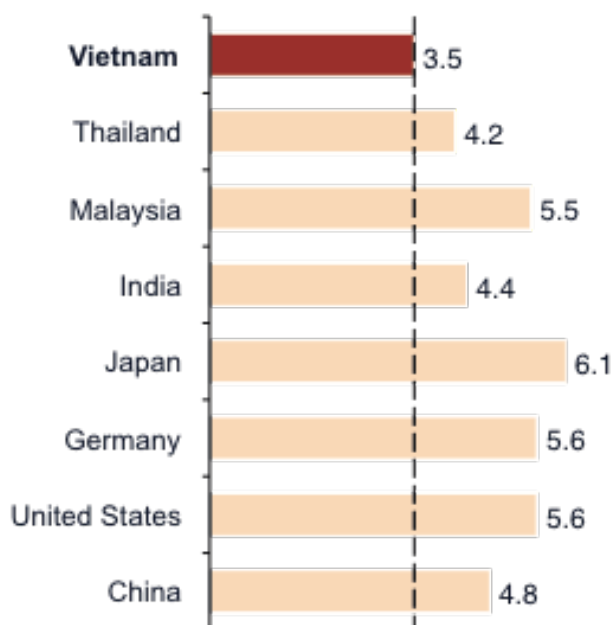
In kilometers per square kilometer area

Road density	India	Japan	Malaysia	Thailand	Vietnam
Highway	0.08	0.15	0.06	0.01	0.05
Expressway	0.03	0.02	0.01	0.001	0.002

Source: Central Intelligence Agency's The World Factbook: <https://www.cia.gov/library/publications/the-world-factbook/>.

Figure 2.23. WEF GCI Road Quality Index, 2016–2017

Road infrastructure rated on a scale from 1 (extremely poor) to 7 (extremely good)



Source: World Economic Forum (http://reports.weforum.org/pdf/gci-2016-2017-scorecard/WEF_GCI_2016_2017_Scorecard_EOSQ057.pdf); Vietnam Ministry of Transport.

Note: WEF GCI = World Economic Forum Global Competitiveness Index

Taking steps to improve infrastructure, Vietnam directs a significant portion of GDP, approximately 8 percent) into infrastructure projects. Additional government efforts, such as establishing the National Road Maintenance Fund under Decree 18/2012, aim to deliver better quality roads across the network through more adequate, predictable, and transparent road maintenance expenditures. However, according to the fund’s management, the fund only meets about 45 percent of the demand for repair and maintenance of roads (Quy 2018).

ii. Multimodal infrastructure

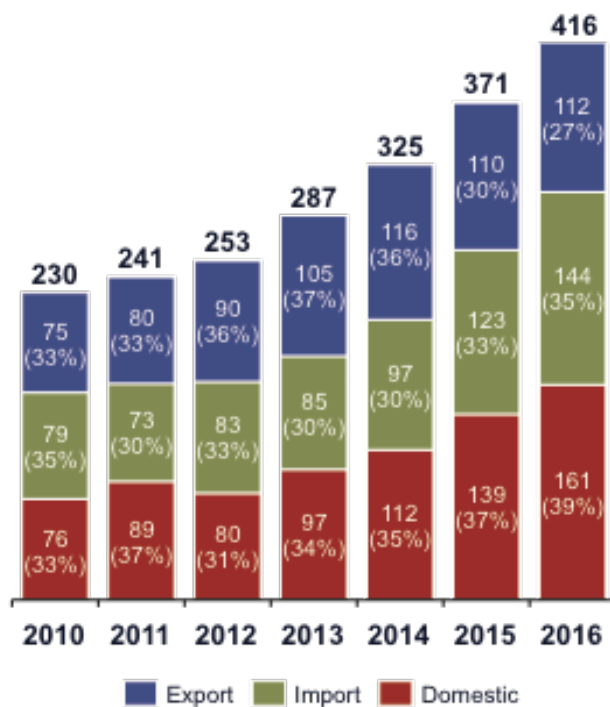
Roads form the backbone of the freight transportation in Vietnam. However, as discussed above, given the high economic growth and growth rates of commodities, the traffic load on roads—particularly on highways—is expected to rise. Thus, it is equally important to develop other modes of transport, namely coastal waterways and the IWT network, along with port and ICD infrastructure, to shift some freight load from roads onto other modes. The increased use of alternate modes of transport can also assist in consolidating more freight and lowering logistics costs and GHG emissions.

Coastal shipping

Although the majority of throughput at seaports is for import-export, about 39 percent of cargo is transported domestically. Over the past several years, the volume of domestic freight has increased rapidly, experiencing a 13.4 percent growth rate (figure 2.24).

Figure 2.24. Maritime Cargo Throughputs, by Purpose of Transportation

In million tons and percentage of total, 2010-2016



Source: VINAMARINE (<http://www.vinamarine.gov.vn/Index.aspx>) 2015 data.

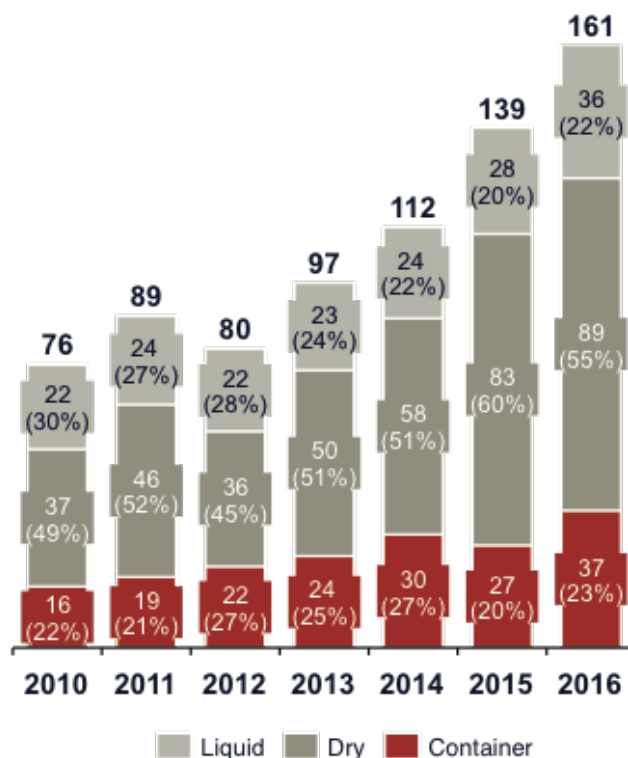
Note: Excluding transshipment

Analysis of contributions by seaport groups to the total maritime cargo shows seaports in the northern and southeast regions contribute 75 percent of the total throughput.⁷ Thus, this study focuses on developing the two major seaports in Hai Phong and Ho Chi Minh. Developing the coastal shipping route of North Vietnam–South Vietnam could also potentially divert road traffic from Hanoi–HCMC, one of the longest and most significant routes for freight flow.

Dry bulk cargo comprises the majority of domestic cargo currently transported via coastal shipping (figure 2.25). However, an increase in the containerization rates of cargo could encourage multimodality, which is dependent on standard dimensions of cargo. This would also promote the transportation of more commodities from short distances by trucks to longer distances by coastal shipping or IWT. Promoting containerization requires the development of infrastructure, such as gantry cranes and forklifts, to handle containers at ports. This enables multimodality, as goods are transferred in standard ISO containers (manufactured according to the specifications of the International Organization for Standardization, or ISO), which can be loaded and unloaded easily between trucks and ships.

Figure 2.25. Domestic Cargo Throughputs, by Type of Cargo

In million tons and percentage of total, 2010-2016



Source: VINAMARINE (<http://www.vinamarine.gov.vn/Index.aspx>), 2015 data.

Heavily dependent on imports and exports, the Vietnam economy renders the seaports an integral component for the transportation of imported and exported commodities. Currently, only two deep-water ports—Da Nang and Cai Mep—can be used without the need for transshipment. The most heavily used terminals of Hai Phong, Ho Chi Minh, and Cat Lai require transshipment at foreign deep-sea ports, which increases costs by 30 percent (Asia Times 2018). Thus, diverting international cargo to the deep-water Vietnam ports, while using the remaining ports for domestic cargo, is crucial.

Inland waterways

With 224 river ports and 8,800 landing stages, Vietnam’s IWT constitutes 17 percent of all freight transport. Vietnam’s coastline spans 3,200 kilometers, with over 19,000 kilometers of inland waterways and 45 main routes used for transporting primarily bulk goods. Almost all cargo moved through IWT ports remains in Vietnam; only 3 percent of cargo is transported internationally (VIWA 2017).

With the rivers influenced by flood seasons and high levels of settlement, particularly in the Mekong Delta region (VIWA 2017), the IWT infrastructure requires significant improvement to its fleet, cargo landing stages (port facilities), and adequate dredging and channel expansion to maintain waterway and canal depths.

The typical cargo vessel size is about 100 deadweight tonnage (DWT), compared to a typical vessel size of over 2,000 DWT found in countries with well-established IWT networks. As more industries locate next to riverbanks, smaller landing stages and wharfs have proliferated. Reports indicate 15 percent of the cargo landing stages do not have operational permits and are unsafe. In addition, many access roads leading to IWT ports are small and have a handling capacity of 10–15T trucks, limiting the use of larger trucks for last-mile delivery of goods carried through the IWT network.

Another key issue with the inland waterways network is the low clearance of bridges. Most bridges, on the two main rivers of Vietnam (Mekong and Red River), due to their low heights, do not allow the passage of big barges. Many waterways in the Mekong River in the south and Red River in the north can accommodate a maximum barge size of 96 twenty-foot equivalent unit (TEU), half the size limit on European rivers (Ward and Pham 2011). In addition, critical and busy waterway sections, such as Cho Gao canal in the Mekong Delta region—an artery connecting HCMC to the Mekong Delta—require traffic management.

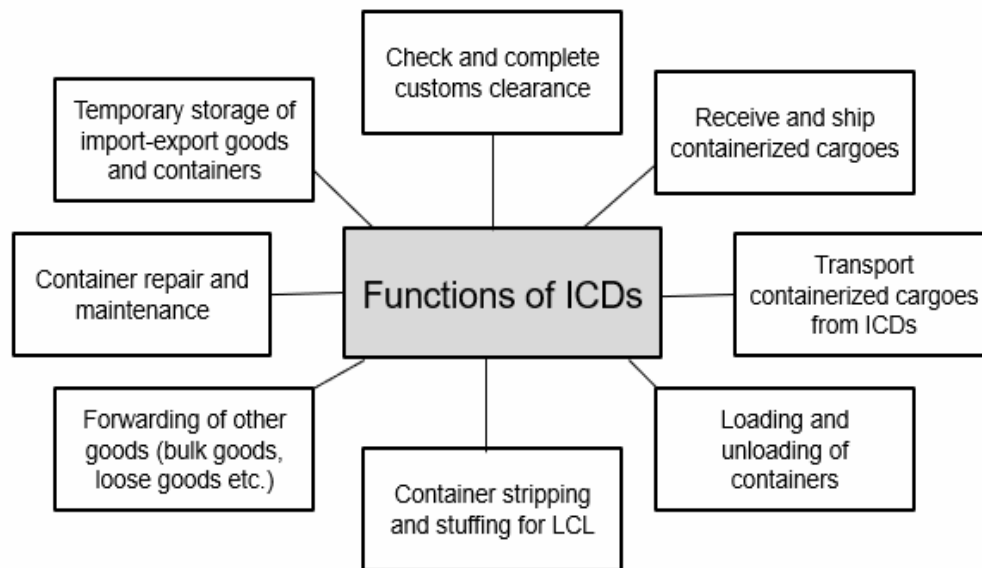
Inland container depots

An inland container depot, or ICD, is an inland, intermodal transportation facility or area that provides the services of handling, temporary storage, and customs clearance for containerized cargoes entering and leaving seaports. Figure 2.26 illustrates the various functions of an ICD.

Forming the interface between roads and the ports, ICDs play an integral role in road freight transportation. Also, given the high fragmentation of freight, ICDs serve as potential sites for freight consolidation, which can reduce the traffic by decreasing the number of trucks required to carry the same amount of freight. Furthermore, as the global trend moves toward increasing cargo containerization, developing ICDs to handle the higher container traffic becomes more important—through modernizing the cargo handling equipment (e.g., cranes, forklifts, timer racks, pallet racks, lift trucks, etc.).

Interviews with truck operators and logistics companies reveal many shippers use their own warehouses for packaging and storing, going directly to the ports for clearance to avoid the high congestion around ICDs' long processing time. The inconvenient locations of ICDs—often situated far from industrial zones—is another reason given for avoiding ICDs. The ICD Development Master Plan 2020 (TDSI 2016) addresses some of the key issues, laying down restrictions on the minimum area of an ICD and prioritizing ICDs located near industrial parks and with rail and waterways connections.

Figure 2.26. Functions of Inland Container Depots



Source: TDSI 2016.

Existing regulations

This section discusses the existing regulations in Vietnam having a direct or indirect impact on the trucking sector. The regulations have been divided into four key areas:

1. Planning infrastructure
2. Managing supply players and supply fleet
3. Aggregating demand
4. Streamlining trucking-related processes

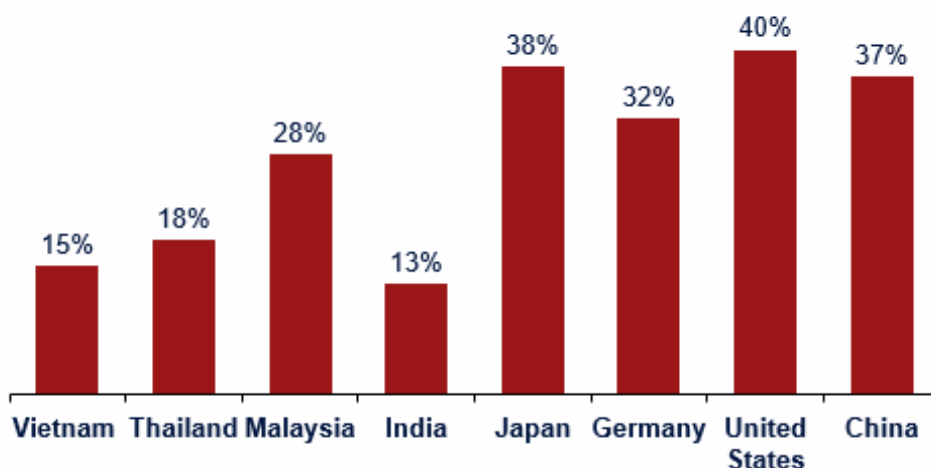
i. Planning infrastructure

According to the World Economic Forum's *Global Competitiveness Report 2016–2017*, Vietnam ranks 79th out of 138 in overall quality of infrastructure, 89th on quality of roads, and 77th on quality of port infrastructure. The GoV is currently working to increase the efficiency and scope of infrastructure projects, through foreign and private investment, public-private partnerships, and equitization. For the country to maintain its status as a manufacturing hub, the government is emphasizing transport projects in industrial zones. To decrease the traffic congestion in large cities such Hanoi and HCMC, major public transportation projects are also being undertaken (Dezan Shira & Associates 2017).

According to data generated via the Global Infrastructure Hub's Global Infrastructure Outlook platform (available at <https://outlook.gihub.org>), the infrastructure investment forecast for the period 2016–2040 indicates that road infrastructure is expected to have the largest gap between investment demand and current investment, and would require an additional 70 percent in funding. Furthermore, Vietnam spends a relatively low proportion of its total infrastructural spend on road projects, compared to other countries (figure 2.27).

Figure 2.27. Global Benchmark of Spend on Road Infrastructure

In percentage of total infrastructural spend



Source: Global Infrastructure Outlook platform (database): <https://outlook.gihub.org>.

ii. Managing supply players and supply fleet

With this study highlighting the major issue of excessive industry fragmentation and the skewing of the truck fleet toward smaller and older trucks, the existing regulations on supply management carry a high importance.

Business permit issuance and FDI

Decree 86/2014/ND-CP is one of the main regulations describing the business conditions and granting of permits for automobile transportation business. Currently, the paid-up capital for setting up a business is not restricted, which could result in the unsustainable fragmentation of the trucking sector. Neither is there a separate law to encourage brokerage firms, which would allow for better cargo supply-demand matching.

However, the decree contains a clause placing a minimum restriction on the number of vehicles transporting goods over 300 km of distance, from 10 autos for companies in central cities, to 3–5 autos for companies in other localities. However, this is not strictly enforced in the sector, in part driven by regulatory complexities and practical on-ground enforcement challenges. Decree 163/2017, which came into effect in February 2018, has increased foreign investment limits in Vietnam’s logistics sector, boosting foreign investment in services like loading and unloading, warehousing—with freight forwarding increasing to 100 percent as per World Trade Organization commitments. However, for road freight transportation, foreign investors can set up their companies as a joint venture with a maximum of 51 percent of equity, provided all drivers are Vietnamese citizens (Saigon Times 2018).

Access to financing for truck fleets

Depending on the credit history of the individual transporter, banks offer commercial vehicle loans, with the vehicle (a truck, in this case) acting as the collateral and the loan-to-value ratio no higher than 80 percent. One major drawback: a significant portion of the loans are used to purchase small,

often second-hand trucks. This creates a need to link loan disbursements to the size and age of the truck, encouraging the trucking industry to move toward a younger and larger-sized fleet and the resulting lower transportation costs and emissions.

Road safety for truck drivers

Both the Government of Vietnam and key industry stakeholders place an emphasis on road safety, and consider driver health and behavior an important element of road transportation. The National Road Safety Strategy 2020 and a Vision to 2030, is a government initiative with these major goals:

- Road safety management
- Education and awareness among passengers and pedestrians
- Road infrastructure improvement
- Vehicle and driver training
- Traffic law enforcement
- Provision of rescue and medical aid for post-accident immediate response

Traffic safety committees established at commune, district, provincial, and national levels aim to reduce the number of road accidents in the country. Further, driver training and licensing procedures included in Decree No. 46/2012/TT-BGTVT regulate the current training, examination, and granting of licenses for motorized vehicles.

With truck drivers forming the backbone of freight flow by roads, driver safety and behavior represent an important aspect of the road transportation. Road accidents account for nearly 98 percent of transportation-related accidents, with 67 percent caused by motorbikes and 27 percent caused by automobiles (Vietnam News 2017). Thus, focusing on driver training and licensing procedures will help ensure drivers are qualified and following safe operating procedures, which will boost pedestrian safety as well.

iii. Aggregating demand

While the section on urban trucking (below), discusses regulations controlling city-level demand management, such as time restrictions, congestion pricing, land-use management, etc., streamlining truck demand for intercity freight flow involves the development of aggregators to help consolidate freight and increase truck use.

Recently, Vietnam has witnessed the emergence of on-demand logistics players, though freight volumes and registered members remain low (the section on Supply Factors in Chapter 2 discusses the contributing reasons). In terms of policy, currently no legal framework exists to regulate and guide the operations of these start-up aggregators. In addition, industry players offer limited funding and mentorships to support digital logistics start-ups.

As a further hindrance to the growth of on-demand aggregators, while Vietnamese brokerage firms working with the shipping industry do operate regionally or locally, the international brokerage firms (C.H. Robinson and Transplace, for example) have thus far not expanded into Vietnam.

Thus, promoting the use of start-up digital and physical aggregators and brokerage companies could more effectively pool the capacity of numerous small operators and increase the information flow between shippers and truck operators.

iv. Streamlining trucking-related processes

Complex, time-consuming trucking-transit processes increase costs. Trucking-related processes refer to the operational processes that occur during the journey of the truck driver, from picking up goods from the shipper to unloading goods at the delivery station, along with processes involving road accidents, unauthorized stoppages for informal fees, and unnecessary waiting at toll and customs clearances. The trucking survey conducted as part of this study revealed that truck drivers perceive future policies on simplified and paperless documentation in a positive light.

Accordingly, over the past several years, the GoV has been increasing the use of technology to improve access to information and reduce the documentation required for freight transportation. E-tolling and e-custom, discussed below, represent two pilot programs with the potential to significantly improve Vietnam's trucking efficiency.

Electronic toll collection

With a view to expand to all national highways, Vietnam has launched pilot projects for the electronic toll collection (ETC) system in HCMC. The new system is expected to reduce the logistics costs—with fewer tollbooth personnel—and prevent tollbooth delays, leading to better fleet efficiency.

In 2011, VietinBank and the DRVN piloted the ETC at six tollbooths on national roads. After the success of the pilot program, the government laid plans to install ETC system nationwide, and will introduce barrier-free ETC systems that link drivers' bank accounts to ETC accounts. Once ETC is fully equipped and implemented, the system is expected to reduce annual toll operating costs by VND 3.4 trillion.

E-customs

In 2014, Vietnam implemented a rules-based e-customs system known as VNACCS/VCIS (Vietnam Automated Cargo and Port Consolidated System/Vietnam Customs Information System) to replace the paper-based clearance system reportedly prone to delays and subject to informal payments. As a result of e-customs, the preparation time for import and export dossiers has decreased by nearly 30 percent and 40 percent respectively. In addition, the average time for import and export clearance (from registration declaration through clearance permission) has been reduced by 18 percent and 58 percent respectively (JICA 2015). However, reports indicate the e-customs system can be less than user-friendly, with interruptions in the system occurring during installation or declaration. Moreover, low Internet speeds in the country often hinder online declaration for both merchants and customs departments.

Urban Trucking

With the rapid growth of cities, such as HCMC and Hanoi, it is important to study the nature of urban trips under 100 km, the key challenges faced, performance bottlenecks, and the opportunities therein for improving operational efficiency and links with intercity freight movement. Companies involved in urban trucking are often the first- and last-mile delivery partners of the intercity transportation companies. Some of the shorter trips under 100 km include the “drayage” of ISO containers between a maritime or river port and its immediate urban and industrial hinterland.

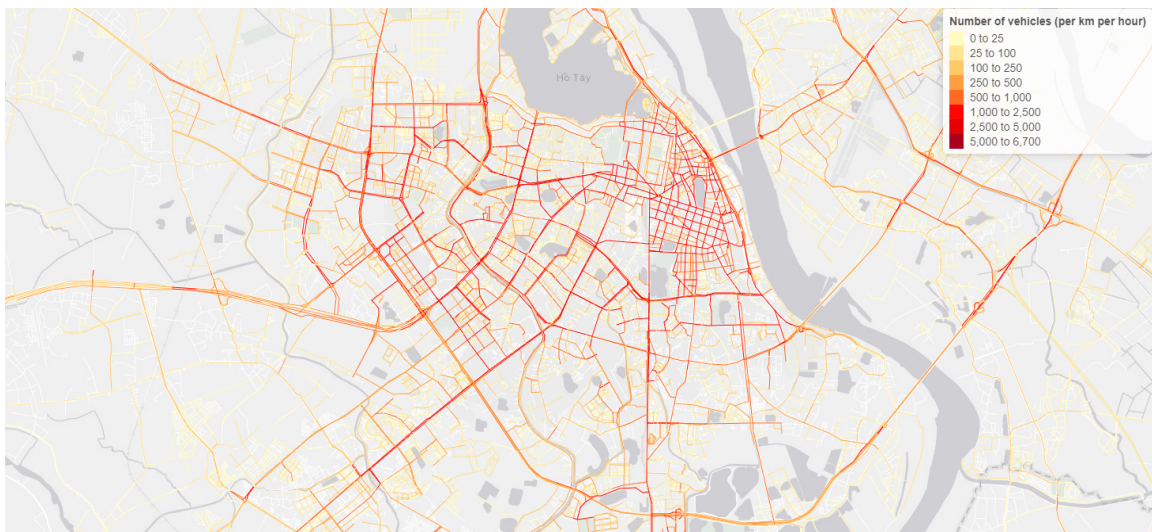
This section discusses the key challenges in the urban trucking operations through analyzing case examples of the two major metropolitan gateways, Hanoi and HCMC. For these two cities, the current traffic congestion, city regulations affecting the traffic flows, and the upcoming infrastructural plans are discussed in detail.

Case study 1: Hanoi

The population density of Hanoi is as high as 2,300 people per sq. km, compared to nearly 300 people per sq. km for Vietnam as a whole. Therefore, urban trucking companies face high levels of passenger traffic when running logistics services within the city, with nearly 80 percent of the road users riding mopeds (Petsko 2016). In addition, the car ownership is also expected to rise, due to increasing disposable incomes. Together, the passenger and cargo traffic lead to high levels of congestion in the city. Government studies calculate that traffic jams in Hanoi cause VND 12.6 trillion (US\$600 million) in economic losses every year (Saigoneer 2017). Analysis of the DRVN’s commercial vehicle tracking system, or CVTS, show high congestion patches, particularly in the city center (figure 2.28).

Hanoi also acts as a transit stop for importers and exporters operating out of the Hai Phong port. Hanoi offers office space, and many logistics companies and distributors have opened offices and warehouses in the city center. Goods from Hai Phong Port are brought to the Hanoi-based warehouses and then dispatched throughout Vietnam, adding to the city’s traffic congestion. However, building warehouses and consolidation centers in the city’s outskirts would prevent this import-export traffic from moving into and out of the city, reducing congestion.

Figure 2.28. Traffic Density Representation in Hanoi Using CVTS Data



Source: Unpublished data from the commercial vehicle tracking system (CVTS) data, provided by DRVN.

Another major source of cargo traffic derives from the logistics operations of e-commerce companies as well as the daily deliveries of restaurants, grocery stores, and other small enterprises. Interviews with logistics companies indicate inefficient intra-city road structures, insufficient overpasses, underpasses, and bridges, which all lead to high levels of congestion. In such circumstances, city planning and zoning take on a greater importance, clarifying the need for the clear demarcation of commercial, industrial, and residential zones. However, residential neighborhoods around industrial areas create challenges surrounding the combination of cargo and passenger traffic.

The GoV has taken some initiatives to streamline the traffic in the city. Cargo truck movement in the city is only allowed during off-peak hours from 9:00 p.m. to 9:00 a.m., which reduces peak-hour traffic congestion. However, the restricted timings also lead to congestion at city entry points during the restricted hours. Urban consolidation centers (UCCs) located at the city fringes serve as potential sites for freight consolidation for goods moving out of the city as well as freight deconsolidation into smaller trucks for goods moving into the city. In addition, UCCs could provide organized parking spaces for the larger trucks. Chapter 5 discusses the advantages of establishing UCCs at city fringes.

Case study 2: Ho Chi Minh City

HCMC is one of the densest cities in Vietnam with approximately 4,000 people per sq. km of area. The CVTS data analysis of the province shows high congestion in the central city (figure 2.29a).

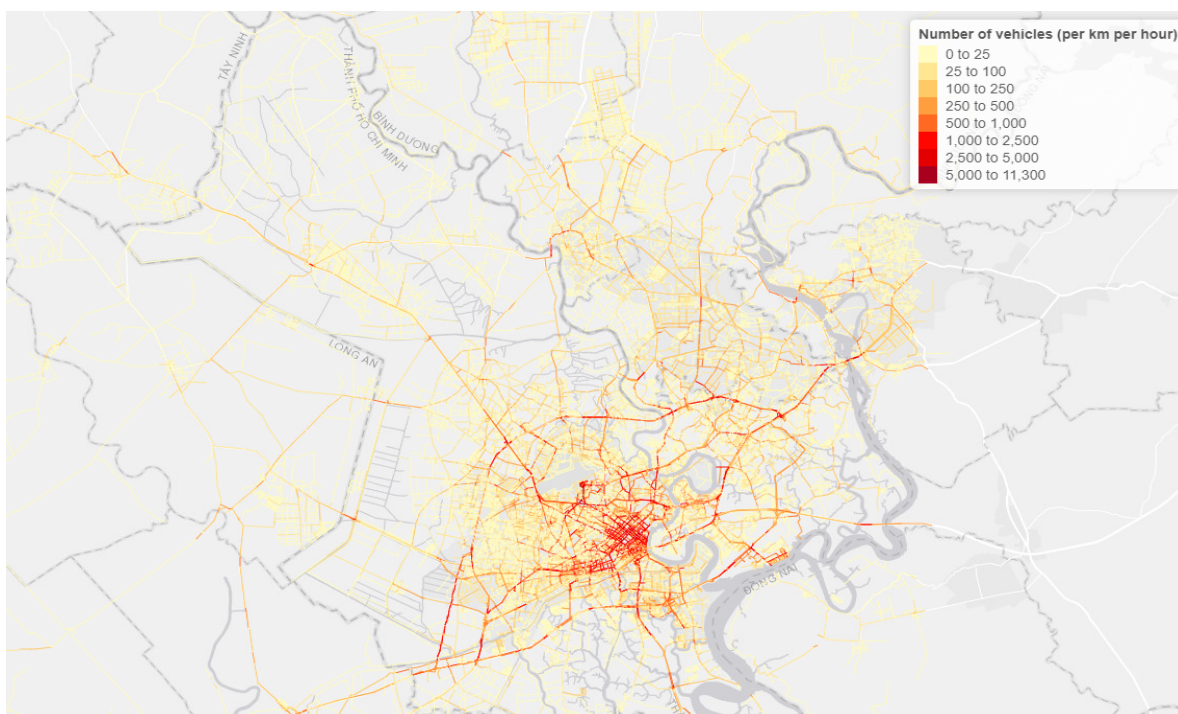
Factors attracting industries include the geographical advantages of HCMC with seaports and river ports and the availability of good quality human resources. While the population growth rate is modest at 1.46 percent, the migration rate is relatively high, at 3.8 percent per annum. Because HCMC is an economic hub for Vietnam, a huge number of vehicle users come to the city, piling

pressure onto the traffic infrastructure. Due to the presence of rivers, the region is also prone to seasonal flooding, which further adds to the traffic problems in the city.

A unique feature of HCMC, distinguishing its traffic management from Hanoi, is the presence of the Ho Chi Minh port near the center of the city (figure 2.29b). The Ho Chi Minh port is one of the most important ports for exports and imports in the country and serves as the main gateway for the region, accounting for 67 percent of the total throughput of all ports in Vietnam. Trucks used for the first- or last-mile delivery of containers and bulk goods from city ports into city centers contribute to the high levels of congestion.

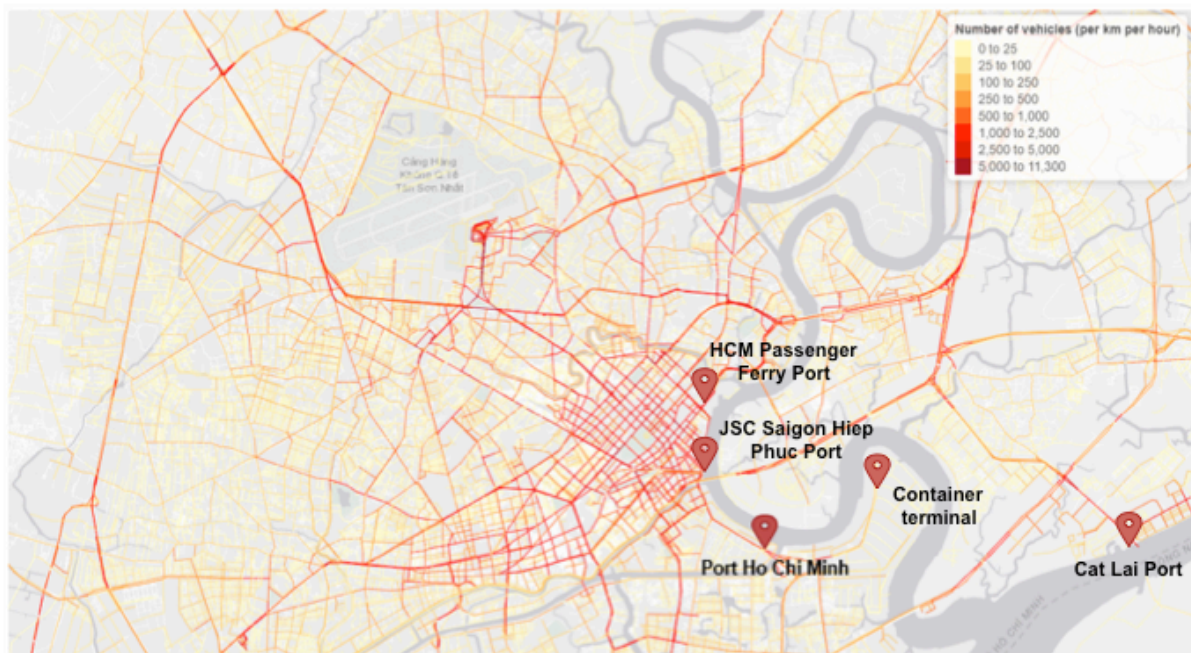
With container terminals located in the city center, city roads—already highly congested with passenger vehicles—serve as access roads connecting the ports to the nearest highway, which accounts in part for the long delays in moving trucks between ports and ICDs. Consequently, these port access roads could benefit from additional lanes dedicated to moving cargo traffic. Further, the Cai Mep–Thi Via Port, an underutilized deep-water port located around 80 km south of HCMC, can handle more throughput from Ho Chi Minh port.

Figure 2.29a. Traffic Density Representation in Ho Chi Minh City Using CVTS Data



Source: Unpublished data from the commercial vehicle tracking system (CVTS) data, provided by DRVN.

Figure 2.29b. Traffic Density Representation in HCMC Using CVTS Data (Zoomed)



Source: Unpublished data from the commercial vehicle tracking system (CVTS) data, provided by DRVN.

Truck traffic in HCMC is also subject to timing restrictions. Laws recently put in place by the HCMC People's Committee restrict light trucks from entering the city's urban area during peak hours from 6:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 10:00 p.m. In addition, heavy trucks and container trucks are not allowed in urban areas from 6:00 a.m. to 10:00 p.m. The HCMC People's Committee, however, is considering granting licenses to allow certain vehicles to operate during these hours. Approved vehicles would include rescue trucks, dump trucks, trucks needed for repair work on electrical equipment, and heavy trucks needed for key construction projects. In addition, light trucks and heavy trucks can operate on ring roads with no time restriction. As discussed in the Hanoi case study, UCCs could potentially offer organized space for parking trucks and consolidating freight.

To summarize the cases of both Hanoi and HCMC together, the key recommendations for improving urban trucking include the following:

- Construct UCCs in the outskirts of Hanoi and HCMC to consolidate and deconsolidate cargo.
- Integrate land use and multimodal transport planning to better separate passenger and cargo traffic
- Dedicate truck lanes for port–city roads
- Shift international cargo to the deep-sea ports while using river ports for IWT

Summary

- The first part of the assessment focused on intercity trucking, which involves haulage of freight from one city to another, typically for distances over 200 km.
- On the supply side, key issues include the unsustainable fragmentation of the market and the highly skewed truck fleet towards smaller and older trucks. The average number of trucks owned per company is five, while 68 percent of the trucks are less than 5T in size. Around 94 percent of trucks are more than five years old. The majority of trucks are imported, with many older truck models not adapted to the Vietnam context. According to the nationwide survey, the trucking industry holds favorable views on potential policies to improve driver safety.
- Related to the demand-side, demand-supply matching suffers from the lack of pan-Vietnam brokerages and digital aggregators. Empty backhauls range from 50 to 70 percent for transport operators, compounded by the seasonality of the products analyzed. The development of aggregators could potentially improve the efficiency of inter- and intra-city trucking through improved pan-Vietnam coverage, balanced supply and demand, and greater transparency.
- In terms of road infrastructure, the demand assessment highlights eight major routes as the important economic corridors for Vietnam, which should be prioritized for future road upgradation proposed by the GoV. These routes include from and to Hanoi–Hai Phong, Hanoi–HCMC, HCMC–Can Tho, and HCMC–Da Lat.
- To optimize the transport system as a whole and to reduce costs and GHG emissions, multimodality via inland waterways and coastal shipping should also be promoted. Chapter 5 explores the specific gaps in the current infrastructure and proposals to mitigate such gaps in the ports and waterways, market structure in terms of availability of coastal shipping lines, the size and design of the vessel fleet, and the supporting infrastructure at inland container depots (ICDs).
- In terms of trucking-related processes, e-tolling and e-customs have the most impact on improving efficiencies. These should be accelerated and augmented with other policies that could support unexpected incidents, such as accidents and unauthorized stoppages.
- The nationwide survey conducted by this study supports the study’s key findings, revealing that the industry viewed the following potential policies could have the most beneficial impact: (a) road and truck-related infrastructure facilities, (b) seamless processes for movement of goods, and (c) fleet modernization.

- The second part of the operational assessment includes case studies on Hanoi and HCMC to better understand trucking characteristics within cities. Urban trucking serves the first-mile and last-mile logistics needs, and/or the drayage of containers or goods from ports to the nearest industrial hinterland. The two cities both witness high congestion levels with high population densities, and both regions serve as major economic hubs and important production and consumption centers for Vietnam.
- Both cities have been combating high traffic levels through time restrictions on truck travel within the city. However, congestion persists. Hanoi acts as a transit stop for importers and exporters who operate at the Hai Phong port, which adds to unnecessary cargo traffic in the city.
- Construction of urban consolidation centers (UCCs) in the outskirts of Hanoi and HCMC is a viable option to streamline the traffic in the city. The UCCs could reduce traffic congestion by providing spaces to consolidate smaller trucks coming from the cities onto the highways, while breaking down the cargo entering the cities to increase road safety. The UCCs could also potentially serve as parking spaces for trucks waiting outside the cities due to time restrictions on truck travel.
- HCMC, on the other hand, has a seaport and terminals in the city center, which cause congestion. Dedicated truck lanes for port-city roads could potentially reduce congestion, particularly in HCMC. International cargo should also be encouraged at the deep-sea ports outside the city, while reserving city river ports for inland waterways transport.

Notes

1. Data for 2018, accessed via a financial database of trucking and logistics companies in Vietnam, available to Avention clients.
2. Primary and published interviews with founders of disruptive logistics start-ups.
3. Statistics based on 2018 data (unpublished) from the Vietnam Register: <http://www.vr.org.vn/en-us>.
4. Data from the European Automobile Manufacturers Association (ACEA) statistics database (<https://www.acea.be/statistics>). Germany data includes trucks and buses classified as medium and heavy commercial vehicles (MHCVs).
5. Data extrapolated to 2017 values.
6. CIA online statistics (2013) for Vietnam roadways: <https://www.cia.gov/library/publications/the-world-factbook/geos/vm.html#field-anchor-transportation-roadways>.
7. VINAMARINE (<http://www.vinamarine.gov.vn/Index.aspx>), 2015 data.

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Chapter 3: Logistics Costs Assessment

The Government of Vietnam (GoV) has selected as a development goal to make Vietnam a modern industrialized country by 2020. Transport and logistics services play a major role, integral to boosting the value chain from production to sales and in enhancing the competitiveness of Vietnam in the international market. According to the Vietnam Logistics Business Association (VLA), the growth rate of the logistics industry in Vietnam in recent years has reached around 14 to 16 percent, with a scale of approximately US\$40–42 billion per year (MoIT 2017). Though still relatively young, the logistics business in Vietnam is growing rapidly, mostly from traditional operations, such as transportation, warehousing, and by developing integrated services with higher added value.

Vietnam has shown significant improvement in its logistics services by improving 25 places in the Logistics Performance Index (LPI) (World Bank 2018) from 64 in 2016 to 39 in 2018. All indicators on the LPI have improved, with the highest increase in quality of service (ranked 33, up 29 places), and ability to track and trace goods (ranked 34, up 41 places). However, the logistics costs in the country remains high at 21 percent of the GDP (VoV 2017), which affects the competitiveness of exports and adds to the cost of consumed goods. The typical components of logistics costs are listed below (Zeng and Rossetti 2003):

1. Transportation
 - Freight charge: Cost incurred during delivery using various transportation modes
 - Consolidation: The fee for combining small shipments to form larger shipments
 - Transfer fee: Cost incurred during transfer of goods between different modes
 - Pickup and delivery: Transportation charges incurred between shipper's warehouse and air, rail, or sea consolidator's terminal
2. Inventory holding
 - Pipeline holding: Holding cost during the transfer
 - Safety stock: Holding cost of safety stock
3. Administration
 - Order processing: Salaries of employees responsible for purchasing and order management
 - Communication: Telephone, fax, and information transfer-related costs associated with international logistics
 - Overhead: Rent paid by the international logistics group

4. Customs

- Customs clearance: Fee imposed by local customs to clear goods
- Brokerage fee: Charge levied by an agent acting on behalf of the shipper or the receiver, depending on the delivery terms
- Allocation fee: Per house bill

5. Risk and damage

- Damage/loss/delay: Percentage of the value of each unit shipped that will be lost, damaged, or delayed
- Insurance: Cargo and vehicle insurance costs

6. Handling and packaging

- Terminal handling: Material handling fee charged by the transportation company at the air, rail, or sea terminals
- Material handling: Cost of labor and equipment used to move goods within the shipper's or receiver's warehouse
- In/out handling: Material handling charge levied by the freight forwarder for use of its facilities
- Disposal charge: Fee for taking away an empty container from the receiver's warehouse
- Packaging and supplies materials: Cost of preparing goods for shipment
- Storage: Rental fee of the warehouse space

Worldwide, transportation costs account for the majority of logistics costs. In Vietnam, transportation accounts for nearly 60 percent of the total logistics costs (MoIT 2017). Thus, it is important to frame policies that can enable reduction of transportation costs, which in turn will have a significant impact on the country's overall logistics costs. Transport costs would include the fixed as well as variable costs. Since roads form the majority of freight transportation (about 77 percent of the total), it is important to understand the cost structure of trucking companies in Vietnam. This chapter discusses the transportation costs for truck operators to better understand the key cost considerations for carriers involved in the road freight transport value chain.

Truck Operator Cost Assessment

The profitability-cost assessment for truck operators involves developing a bottom-up model for a truck operator whose primary service is pure transportation. According to Directorate for Roads of Vietnam (DRVN) statistics 2017, the average truck operator owns five trucks. Hence, this model analyzes the profits for truck operators who own up to 30 trucks, assuming that its operations would lie solely in transportation. Further, this profitability model divides truck operators into two types: short haul operators and long-haul operators. The profitability analysis for the two operators differs significantly because of the high variation in the overall costs incurred. Table 3.1 shows the two key parameters differentiating short-haul and long-haul operators.

Table 3.1. Difference between Short-Haul and Long-Haul Operators

Parameter	Short-haul operator	Long-haul operator
Route length	100–200 km	>1000 km
Truck type (ideally)	5–10T	>20T

Source: Primary interviews conducted with truck operators.

Typically, use of larger-sized trucks for long haul operators leads to higher fixed costs and fuel consumption. Furthermore, the annual distance travelled by a truck of a long-haul operator is approximately 2.5 times the distance travelled by a truck of a short haul operator, which leads to higher variable costs.

Methodology

As discussed above, the model classifies truck operators into two types: short haul and long-haul operators. To assess the overall cost drivers, the model used responses from the nationwide trucking survey of more than 110 operators and companies. In addition, to find the exact values for cost and revenue inputs and gain a deeper understanding of trucking operations, the model focused on in-depth interviews from more than 20 truck operators and logistics companies with a transportation arm.

The model divides the cost component into fixed and variable costs. Table 3.2 lists the key cost heads, along with brief descriptions of each.

The revenue, on the other hand, is computed by calculating the freight ton-km travelled by the truck, multiplied by the ton-km tariff rates. The model computes the number of trips for each kind of operator based on the utilization of the truck. Again, this is significantly different for a long-haul operator as compared to a short haul operator, since the latter makes four to five times more trips per annum due to the shorter duration of each trip. The tariff rates are market driven with different rates charged for different truck sizes on specific routes. Longer routes will carry a higher tariff rate than a shorter route for the same truck size. Tariff rates used in this model are taken from truck operator interviews.

Cost heads

i. Fuel costs

Fuel costs are dependent on the fuel efficiency of the trucks and the kilometers travelled by the truck. A truck plying on a short haul (say, along the Hanoi–Hai Phong route) roughly travels around 5,000 km a month, while a truck on a longer haul—such as Hanoi–Ho Chi Minh City (HCMC)—would travel 10,000 km in a month. Fuel efficiency varies according to the size of the truck in the following manner, as shown in table 3.3.

In Vietnam, congestion on roads and the resulting idle waiting time represent a key contributor to reduced fuel efficiency. Smaller truck operators usually purchase older, second-hand trucks, which also deteriorates their fuel efficiency and indirectly adds to the cost of their trip. Additionally, a rise in diesel prices over the last two to three years has further squeezed down truck operator margins, as they are unable to increase tariff rates due to high market competition.

ii. Toll costs

Toll charges vary proportionally according to the size of the truck. Truck drivers often skip the highways and expressways to avoid toll charges; any time saved by using highways and expressways is often offset by extensive traffic jams at city entry points.

The model calculates toll fees using DRVN toll data for toll fees collected, according to truck payloads and the current number of highway tolls. Because long-haul operators use larger trucks and pay more tolls, they have higher toll costs as compared to short-haul operators.

iii. Informal fee

Informal fees refer to the unauthorized payments to traffic or border police to prevent trip delays. Non-compliance is a key reason for detention by traffic police, such as overloading, violation of road laws, etc.; however, truck operator interviews show drivers sometimes pay even when in full compliance to avoid further delays. Informal payments are independent of truck size and are usually paid upon entering a new province, typically at border crossings. As a result, longer trips often lead to more informal fees.¹

iv. Driver salary (fixed and variable)

A driver's salary has two components—a basic fixed salary and a per-trip remuneration, to incentivize the driver to complete more trips. In order to make more money, drivers will often drive more than the government-mandated limit of 10 driving hours per day.²

For both fixed as well as variable components, driver salary for a long-haul driver is higher (1.5–2.5 times) than a short-haul driver; longer hauls involve more risks and keep the driver away from home for longer durations, and thus require higher remuneration. Based on the truck operator interviews, the annual values for driver salary range from VND 75 million to VND 250 million.³

Table 3.2. Key Cost Heads for Truck Operators

Cost type	Cost head	Description
Variable costs	Fuel costs	Cost of fuel consumed
	Toll costs	Toll fee paid at the booth
	Informal fee	Informal payments made on the way to prevent vehicle detention
	Variable driver salary	Driver salary component paid on a per trip basis
Fixed costs	Inspection fees	Fees paid to VR for periodic inspection and grant of certificate
	Road maintenance fee/road user charges	Fee paid for the usage of trucks on roads
	Fixed driver salary	Driver salary component, which is fixed irrespective of driver productivity
	Administrative staff salary	Fixed salary paid to the administration department
	Office rent	Rent for office space, irrespective of truck fleet size and efficiency
	Insurance costs	Insurance premiums for cargo and truck
	Maintenance costs	Annual servicing costs of trucks as well as on-road maintenance
Post earnings before interest, tax, depreciation and amortization (EBITDA)	Interest costs	Interest paid on the vehicle loans
	Depreciation	Depreciated asset (truck) costs
	Opportunity costs	Cost of opportunity for down payment of vehicle loan
	Tax	Corporate taxes, as applicable

Source: Primary interviews conducted with truck operators.

Table 3.3. Fuel Consumption by Truck Weight

Truck size	Fuel efficiency (L/100km)
0–5T	11
5–10T	13
10–20T	20
>20T	27

Source: Primary interviews conducted with truck operators.

Another important point of difference here is that a short-haul operator only employs one driver per trip on a shorter route, typically covered in a day. A long-haul operator, however, employs two drivers per trip, with each driver normally operating a full 10 hours per day. For example, a truck can cover the Hanoi–HCMC route in approximately 48 hours (one-way) with two drivers collectively driving 20 hours per day.

Also important to note: the average truck speed in this route (roughly 1,600 km) comes out to 40–50 kmph, despite the use of highways, indicating the significant impact congestion has on transit speeds.

v. Inspection fees and road user charges

Inspection fees and road user charges comprise fixed costs that do not depend on the distance covered. Charged annually or semi-annually on a per-truck basis via inspection centers, inspection fees are paid to the government. The inspection centers, under the supervision of the Vietnam Register (VR), issue certificates indicating trucks are suitable to ply the roads. Traffic police can check certificates at any time. The inspection cost is governed by Decision No. 138/1999/QĐ/BVGCP, showing smaller trucks pay lower fees as compared to larger trucks. To encourage trucks to undergo regular inspection, the fee is kept reasonably low (VND 230,000–460,000). Even so, approximately 10 percent of trucks in operation do not return for annual inspection.

Road user charges, governed by Circular 293/2016/TT-BTC, are paid based on the truck’s use of roads. Typically, the owner, operator, or manager of the vehicle is responsible for paying the road user charges. The road user fee varies according to truck size: smaller trucks pay less; larger trucks pay more, to compensate for the greater demands larger trucks (with larger payloads) place on transport infrastructure.

vi. Administrative salary and office rents⁴

Expenses such as salary for administrative staff and office rental costs are independent of the size of the truck and the distance travelled by the trucks. These expenses are usually linked to the number of trucks owned by the operator, since operating a company requires a minimum amount of office space and administrative personnel. In general, this cost is spread across more trucks as the scale of the company increases.

In Vietnam, companies typically have a ratio of one administrative person for every four trucks. If the companies offer additional services apart from pure transportation, the fixed cost of administrative staff is divided across all services, thereby giving scale economies. Office rents, on the other hand, are dependent on the location of the office and property rate differential. Truck companies in prime industrial areas of Hanoi and Ho Chi Minh City (HCMC) pay higher rents than companies operating in smaller provinces of Vietnam.

vii. Insurance costs

Truck operators pay two kinds of insurance premiums—the mandatory civil liability insurance to cover third-party damage and the optional vehicle insurance to cover damage to the truck itself. For this study, the model assumed the operator has purchased both insurances. Based on the focused interviews, mandatory insurance premiums total an estimated 1 to 2 percent of the truck costs, while the optional insurance premiums total approximately 3 percent of the truck costs.

While Decree 103/2008/ND-CP mandates the purchase of insurance for civil liability for all motor vehicle owners (including trucks), no law mandates the purchase of insurance for damage to the truck or cargo. While companies usually buy optional vehicle insurance to cover truck damage in case of an accident, they often do without cargo insurance. In contrast, shippers will generally opt for cargo insurance, to insure expensive goods. However, if goods are damaged in transit due to accident, theft, etc., and the driver is proven to be at fault, the truck company is liable to pay its customer. The general trend is for companies to pay off the damage costs on a case-by-case basis, rather than buying the cargo insurance upfront.

viii. Maintenance costs

Although maintenance costs will vary according to the age of the trucks, operators report that they usually send all trucks in their fleets to a third party for maintenance once or twice a year and thus do not differentiate based on the age of the truck. The maintenance costs in this model are divided into two parts: 1) the annual or semi-annual service charges, and 2) the tire costs, which includes on-road maintenance costs caused by the everyday wear and tear.

The annual service charges will vary according to the size of the truck, and range from VND 4 million for a <5T truck to VND 40 million for a 31T trailer. The tire cost, on the other hand, is also dependent on the truck size since larger trucks require more expensive tires. Since tires have a fixed lifetime (around 60,000 km per tire), the tire cost also depends on the kilometers travelled by the truck, with long-haul operators facing more wear and tear and on-road maintenance costs.

ix. Interest, opportunity cost, depreciation and tax

The fixed and variable costs discussed above give us the gross margins of an operator. Chapter 3 includes a section (Revenue Computation) discussing how the model computes net margins for an operator. This model also assesses the four cost heads appearing after Earnings Before Interest, Tax, Depreciation and Amortization (EBITDA) in an operator's Profit and Loss (P&L): interest, depreciation, opportunity cost, and tax.

Interest cost: Interest cost refers to the financing costs for the purchase of the trucks. Trucks are most often purchased on loans with a 10 percent interest rate. Truck operator interviews indicate that getting a loan is easy, but the interest costs are quite high. In general, truck purchases require, on

average, a 40 percent down payment, with the rest financed through loans, though this ratio varies according to the size of the company. Large companies often have enough cash reserves to make a higher down payment than small truck operators (as high as 70 percent). The interest costs, as modeled here, depend on the price of the truck, and thus are usually higher for a larger truck.

Depreciation: Truck asset depreciation is an important component used to calculate the return on capital employed (ROCE) of the trucks. Based on truck operator interviews as well as other similar studies, the depreciated truck value is calculated by decreasing 10 percent from the last year's value. The average value of the asset (truck value) at the beginning and end of the year contributes to the capital employment of the company.

Opportunity cost: The down payment discussed above could be used by the operator to invest back into the business, and thus accounts for the opportunity cost of the operator. The cost of capital is generally estimated at 15 percent—the average return on equity (RoE) in Vietnam—and this amount is used to calculate the opportunity cost of the operator.

Tax: In this model, the standard corporate tax rate (20 percent) is used for the truck operator. Although the government offers special tax rates and other incentives to foreign and domestic small and medium-sized enterprises (SMEs), the model does not distinguish between types of business, and instead calculates the tax based on net margins.

Revenue computation

Tariffs for freight transport are defined on a per-truck basis, based on the truck types available. When translated into a per ton-km basis, long-haul tariffs are much lower than short-haul tariffs. An average of VND 1.5 million is charged for a small 5T truck plying a short route like Hanoi–Hai Phong, while an average of VND 35 million is charged for a 25T truck plying the Hanoi–HCMC route. Tariffs can vary significantly from one company to another based on the services that they offer. Some companies offer custom clearances, etc., which will add to their prices. Because truck operators are responsible for finding shipping orders on the return trip (and empty backhauls can range from 50 to 70 percent), tariff prices are generally listed for one-way trips. The cost incurred while returning with no load is directly borne by the operator, not the shipper.

The model takes the truck availability rate as 80 percent, which gives the net number of operational days for the truck in a year. This is based on the nationwide trucking survey. Trip time is inclusive of the running time, as is idle time spent on the trip. Using the number of operational days and the trip time, the model computes the annual number of trips completed by both long- and short-haul truck operators, which then gives the total annual revenue for each operator.

Analysis and model output

Based on the cost and revenue assumptions discussed in the above sections, the model builds a P&L statement for the truck operators, which provides the major cost drivers by estimating the proportion of each cost head (discussed earlier) in the overall costs. The costs and revenues are indicated in VND per ton-km to point out the effectiveness of a larger truck versus a smaller truck. And, as the number of trucks owned by the operator increases, scale economies can be realized, while the net margin improves significantly too.

The following section discusses three key areas (for both types of truck operators):

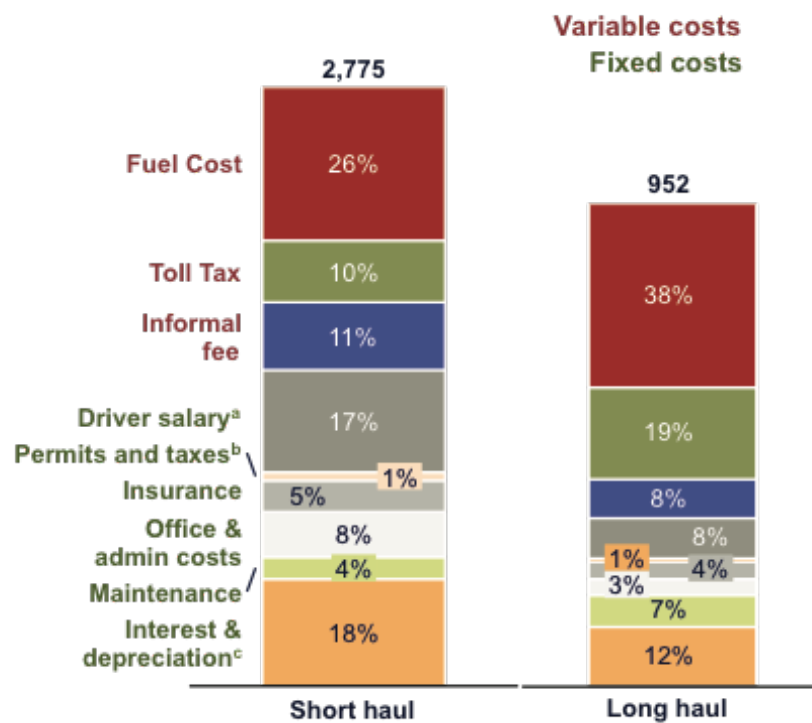
1. Key costs drivers
2. Variation in costs with truck size
3. Scale economies

i. Key cost drivers

The annual costs per truck (in VND per ton-km) for short and long hauls are shown in figure 3.1.

Figure 3.1. Annual Costs per Truck for Short and Long Hauls

In Vietnamese dong (VND) per ton-km



Source: Primary interviews, A.T. Kearney analysis conducted as part of this study.

Note: 5-10T truck used for short hauls, >20T truck used for long hauls

a. Includes fixed and variable salary

b. Includes road maintenance fee

c. Includes cost of capital

As seen in the figure above, variable costs for a short-haul operator account for 52 percent of the total costs, while for a long-haul operator, variable costs could account for up to 66 percent of annual costs. Thus, a long-haul operator might show a more consistent per-km cost and therefore a more consistent gross margin, operating margin, and profit margin. A short-haul operator, on the other hand, may achieve higher margins as the distance travelled by its trucks increases, since revenues will increase but costs will not; however, this can also result in extremely low margins if the demand for trucks falls.

The top five cost heads for the operators are fuel costs, tolls, informal fees, interest costs, and driver salaries. The difference in the proportion of costs for the two operator types is determined by truck size and kilometers travelled. Fuel cost is the most critical cost element for truck operators, representing the higher proportion of overall costs. Since fuel costs are a direct function of the truck type, it is important to focus on improving future truck engine designs to make them more fuel efficient. Other areas of improvement would be reducing congestion and wait time on roads to reduce the amount of fuel wasted during idling. Toll fees and interest costs are the next highest contributor to overall costs (together they account for approximately 30 percent of total costs). Tolls and interest costs are regulated by government and can be lowered only through government interventions, where appropriate. Informal fees hurt the operators the most, and this unnecessary cost burden needs to be tackled through improved operator compliance and governmental reforms to make the transportation process more transparent.

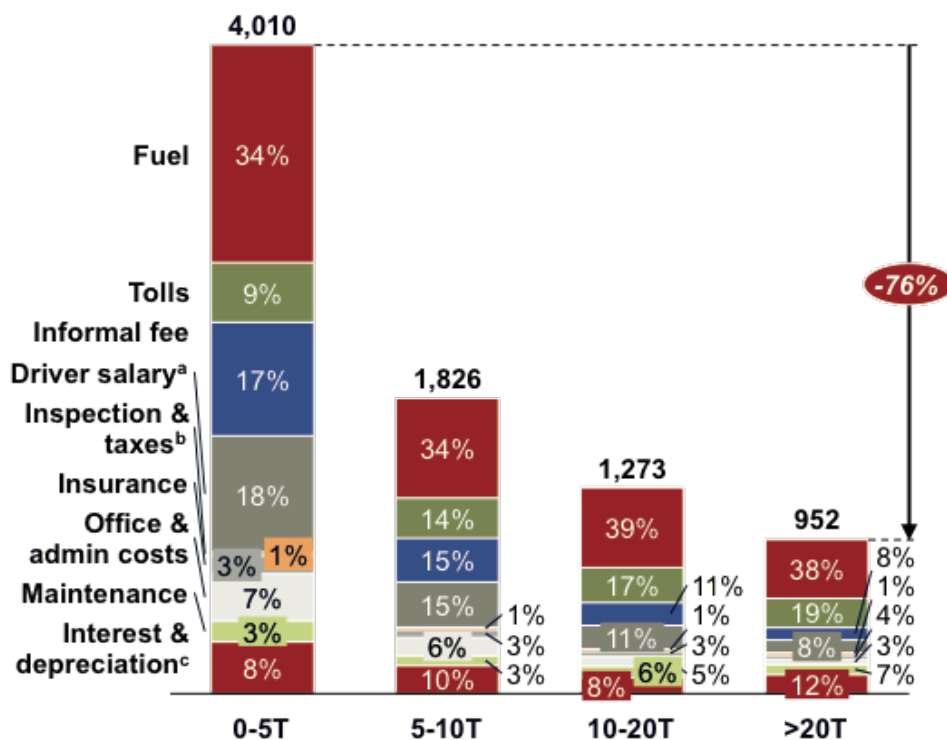
Policy interventions aimed at reducing these major costs will be beneficial in reducing the overall transportation costs, and consequently, the logistics costs for Vietnam.

ii. Variation in cost with truck size

The costs per ton-km decreases as truck size increases. The major cost heads, however, remain the same, as discussed in the above section. Costs independent of the truck size, such as driver salaries, informal fees, administrative expenses, and office costs, are spread across higher freight tonnage. Costs dependent on truck size, such as fuel, tolls, maintenance, etc., also reduce to a lower cost per ton-km, thanks to the greater freight carrying capacity of larger trucks. The cost variation for a long-haul operator shown in figure 3.2 clearly indicates larger trucks are more efficient and lead to greater freight haulage with lower effective costs. For example, shifting from a 5T truck to a >20T trailer (for both short- and long-haul operators) reduces costs by approximately 76 percent.

Figure 3.2. Variation in Transportation Costs, by Truck Size

In Vietnamese dong (VND) per ton-km



Source: Primary interviews, A.T. Kearney analysis conducted as part of this study.

Note: Freight cost per truck per ton-km for a 1,500 km trip

a. Includes fixed and variable salary

b. Includes road maintenance fee

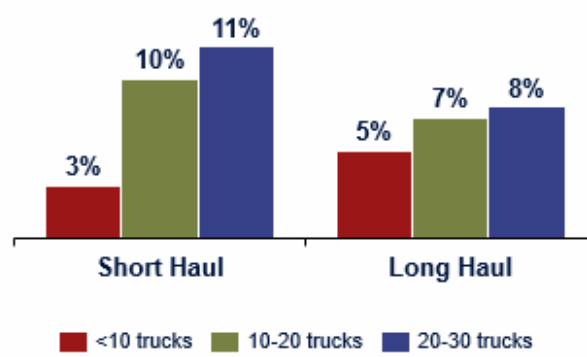
c. Includes cost of capital

iii. Scale economies

A trucking company’s scale is measured in terms of the number of trucks owned by the company. In this model, the profitability of a truck operator is expressed in terms of net margins and the ROCE. While net margins are purely dependent on profits made by the truck using the cost and revenue parameters discussed above, ROCE also includes a component of working and fixed capital. For a truck operator, the asset (truck), functions as the fixed capital, while the working capital is earned from revenues.

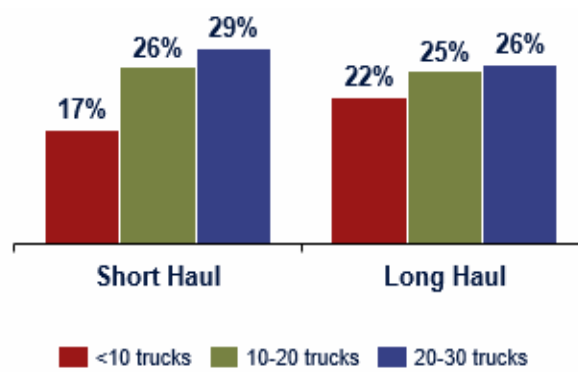
Profitability of truck operators typically increases with the number of trucks owned. Scale economies is achieved as the fixed costs are spread across more trucks, leading to higher profits per truck, which then translates to higher margins and ROCE. The profitability variation with company scale is shown in figure 3.3 and figure 3.4. Given that truck companies in Vietnam own an average of five trucks each, we see low margins for these companies, in the range of 3 to 5 percent, which can affect sector sustainability.

Figure 3.3. Variation in Net Margins by Fleet Size of Truck Operators



Note: Net margin = profit after tax ÷ total revenue. Profit after tax = total revenue – (fixed costs + variable costs + interest + depreciation + opportunity cost + tax).

Figure 3.4. Variation in ROCE by Fleet Size of Truck Operators



Note: ROCE computed as the net return (excluding interest and opportunity cost) divided by the capital employed, which includes fixed capital (asset value) and working capital (account receivables).

Short-haul operators make higher margins than long-haul operators (for those with >10 trucks). Policy imperatives could improve the profitability of long-haul operators through better infrastructure, control of informal fees, etc., while looking for alternative modes of transport for long haulage in the longer term.

Key inferences

Through the cost model analysis, the key improvement levers of profitability include the following:

- i. **Fleet size:** An increase in the number of operational trucks yields scale economies in fixed cost heads like administrative salaries, office rent space, etc., which leads to higher margins. As the scale increases, the company can also invest in other logistics services, thereby creating scope economies.
- ii. **Truck size and tonnage:** The majority of cost heads—fuel, tolls, maintenance, inspection, road user charges, insurance, and interest costs—are dependent on the size of the truck. Though these absolute costs increase with truck size, the effective cost per ton-km reduces significantly due to increase in freight carried.
- iii. **Route characteristics:** Long-haul trucks crossing a higher number of checkpoints face more informal and toll fees. In general, long hauls always involve more risk than short hauls, such as the need for two higher-paid drivers, which can lower profits.
- iv. **Utilization rates:** Empty backhauls have a major impact on profitability, since they reduce the remunerated distance for the operator. Due to the high variable costs incurred per trip for running empty trucks, long-haul operators face a higher cost burden.

These four key drivers of profitability provide the basis for the development of policy recommendations on an operator level. Chapter 5 discusses the detailed policy recommendations.

Way Forward

Transportation costs are extremely crucial in the overall logistics costs in Vietnam. However, in order to increase Vietnam's trade competitiveness, transportation costs must be lowered. The resulting improved profitability will also help the operators invest in their own businesses and offer additional services, such as warehousing, packaging, customs clearance, freight forwarding, etc. Key cost drivers highlighted in this chapter include the following:

1. The consolidation of smaller truck operators
2. The use of appropriate size trucks for specific routes (e.g., larger trucks for long-haul routes)
3. The aggregation of freight
4. An increase in utilization rates
5. An increase in fuel efficiencies
6. A decrease in unnecessary fees, e.g., informal fees

These key cost drivers will be studied in more detail in Chapter 5, dealing with policy options.

Summary

- Transportation costs account for nearly 60 percent of overall logistics costs. The profitability model, built for this study and based on focus in-depth interviews, assesses the cost structure of the truck operators.
 - The transportation costs are estimated at VND 2,775 per ton-km and VND 952 per ton-km for a short-haul and long-haul operator, respectively, with margins ranging from 3 to 5 percent for small truck operators (owning less than 10 trucks). The variable costs for a short haul represent nearly 50 percent of the total cost, and up to 65 percent for a long haul. The margins and the ROCE increase with the fleet size, indicating scale economies.
 - The top five cost heads for the truck operators are fuel costs, tolls, informal fees, interest costs, and driver salaries, which account for 80 percent of total costs.
 - The model indicates the logistics costs per ton-km reduces with an increase in the number of trucks owned, an increase in truck tonnage, and better truck utilization rates.
- The key takeaways from this chapter, which form the basis of potential policy options, include consolidation of small truck operators, use of larger-sized trucks (particularly on longer routes), and freight aggregation.

Notes

1. Based on the interviews, for a trip of 300km, an average of VND 600,000 is spent on informal payments
2. See Article 65 of Law No. 23/2008/QH12, on road traffic, approved November 13, 2008, by the National Assembly of Vietnam. <https://thuvienphapluat.vn/van-ban/EN/Giao-thong-Van-tai/Law-No-23-2008-QH12-of-November-13-2008-on-road-traffic/88512/tieng-anh.aspx>.
3. For short haul, fixed salary averages VND 4.5 million per month and the variable component averages VND 115,000 per trip. For long haul, fixed salary averages VND 10 million per month and the variable component averages VND 200,000 per trip.
4. The model uses the values obtained from the truck operator interviews. The administrative staff salary is reported to be on an average of VND 6 million per month, while the office rent for a 35-truck company in Ho Chi Minh City is taken to be US\$2,000.

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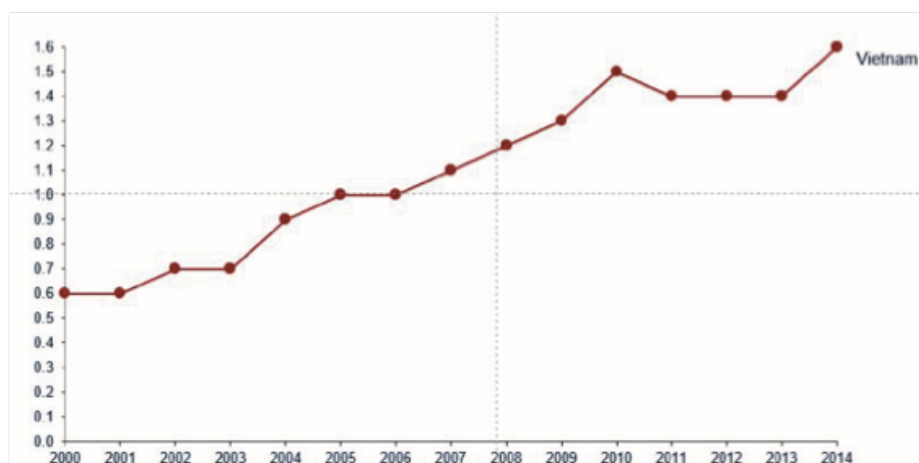
Chapter 4: Greenhouse Gas Assessment

With unprecedented success, Vietnam has transitioned from a centrally planned economy to a market-oriented system. Now, the country faces the key challenge of managing its rapidly developing economy in a sustainable manner while preventing the adverse impacts of environmental degradation and climate change. Leading to increased greenhouse gas (GHG) emissions and reduced resilience to climate change, the harmful effects to air, land, and water caused by industrialization, urbanization, and agricultural intensification have far-reaching implications for Vietnam's energy and transport sectors.

Over the past decade, the emission rate *per capita* in Vietnam has steadily increased; specifically, emissions have increased by nearly 6 times, from 0.3 tons carbon dioxide (CO₂) per person in 1990 to 1.51 tons CO₂ per person in 2010 (figure 4.1). In comparison, over the same time period, China's emissions increased by 3 times, Korea's increased by 2.5 times, and Thailand's increased by 2 times.

Figure 4.1. CO₂ Emissions in Vietnam, 2000–2014

In tons per capita



Source: Organisation for Economic Co-operation and Development (OECD) data on air and GHG emissions (database): <https://data.oecd.org/air/air-and-ghg-emissions.htm>.

In 2017, Vietnam submitted its second biennial update report (BUR) to the United Nations Framework Convention on Climate Change (UNFCCC) (MNRE 2017, 29). As discussed in the report, the GHG inventory indicates the energy sector emitted a total of 151.4 million metric tons of carbon dioxide equivalent (MtCO₂e), equal to 151,402 thousand metric tons (kT), from fuel combustion and fuel production. Of this, the transport sector produced 29.7 MtCO₂e (equal to 29,698 kT). Within the transport sector, road transport (passenger and freight) accounts for the largest share of emissions,

followed by maritime transport. Looking at emissions by fuel type, the report shows diesel, at 42.7 percent, makes up the dominant source of emissions in the transport sector, closely followed by gasoline.

Heavy-duty diesel engines and equipment, used to transport materials, goods, and people, represent significant sources of black carbon, toxins, and greenhouse gases. With rapid industrialization and growing trade, particularly in Asian countries, forecasts estimate emissions having a direct impact on the environment and public health will continue to increase. Though the Government of Vietnam (GoV) has implemented projects and programs to improve the efficiency and environmental impact of freight movements, much work remains.

The energy (fuel combustion and production) sector represents the largest contributor to GHG emissions. Table 4.1 breaks down the emissions by energy sector subdivisions:

Table 4.1 GHG Emissions in Energy (Fuel Combustion and Production) Sector

In thousand metric tons (kT)

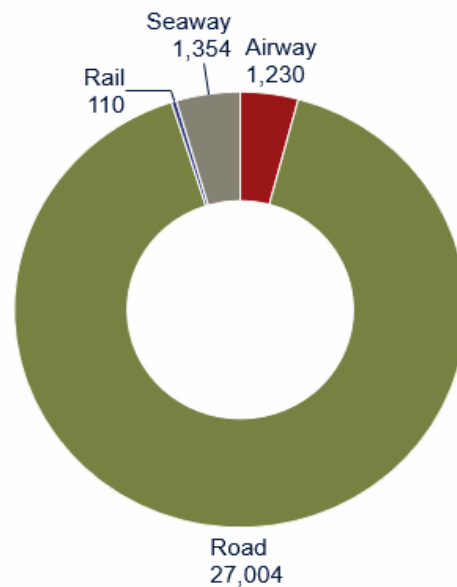
Categories	Gases			
	CO ₂	CH ₄	N ₂ O	Total CO ₂ e
Total	126,914.63	935.91	3.66	151,402.52
1.A. Fuel combustion activities	125,364.91	154.77	3.65	130,320.41
1.A.1. Energy industry	43,527.92	0.71	0.41	43,669.38
1.A.2. Manufacturing industries and construction	40,233.16	8.31	1.12	40,773.46
1.A.3. Transport	29,492.65	4.97	0.27	29,698.24
1.A.4. Other sectors	11,346.81	140.7	1.82	15,405.32
1.A.5. Other (non-energy use)	764.36	0.08	0.03	774.00
1.B. Fugitive emissions from fuels	1,549.72	781.14	0.01	21,082.12
1.B.1. Solid fuels		92.76		2,319.11
1.B.2. Oil and natural gas	1,549.72	688.38	0.01	18,763.01

Source: MNRE 2017.

Similarly, the transport industry can be roughly divided into four sub categories: airway, road, rail, and seaway, with roadways producing the highest levels (more than 27,000 kT), of GHG emissions (figure 4.2).

Figure 4.2. GHG Emissions in Vietnam’s Transport Sector

In thousand metric tons (kT)



Source: MNRE 2017.

Factors contributing to the emissions impact of motor vehicles include vehicle class, weight, age and condition, fuel type, and the terrain traveled. In general, older vehicles contribute higher emissions, while newer vehicles running on cleaner fuels contribute lower emissions.

Other contributing factors to increasing pollutant levels include low quality of roads, absence of comprehensive and effective transport planning and policies, reliance on higher-emission modes of transport (e.g., roads), and traffic congestion, especially in urban clusters, such as Hanoi and Ho Chi Minh City.

Without active interventions to reduce and control emissions levels, GHG and other toxic pollutants will further aggravate the effects of climate change on ecosystems and communities, which could ultimately result in significant social and economic losses.

Government of Vietnam’s Efforts to Reduce GHG Emissions

Over the last few years, the GoV has developed and issued several policies related to the mitigation of GHG emissions. For example, the Nationally Determined Contribution (NDC) of Vietnam, submitted to the UNFCCC, defines a roadmap through 2030 to reduce GHG emissions at a national level. In the document, Vietnam has committed to reduce GHG emissions by 8 percent by 2030—compared to the business-as-usual (BAU) scenario relying on domestic resources—and up to 25 percent by 2030 with international support.

The policies outlined in the NDC roadmap include the following:

- Decision No. 403/QĐ-TTg, dated March 20, 2014, of the Prime Minister approving the National Green Growth Action Plan for the period of 2014–2020. The plan covers 12 activity groups and 66 specific action missions, along with four key themes: local institutional development and green growth planning; greenhouse gas emission reduction and promotion of the use of clean energy and renewable energy; green production; and green living and sustainable consumption.
- Decision No. 2359/QĐ-TTg, dated December 22, 2015, of the Prime Minister approving the National Greenhouse Gas Inventory System. The main objectives of the system include conducting biennial GHG inventories and developing national climate change reports (submitted to the UNFCCC), and contributing to the achievement of low carbon economy, green growth, and GHG reduction targets as detailed in the NDC of Vietnam.

GHG Emissions Model

As explained in the section above, a large proportion of the GHG emissions in Vietnam comes from the road transport sector. The GHG emissions model will help understand the key levers for improving GHG emissions produced by road freight transportation and make possible policy suggestions to reduce the emissions.

Methodology

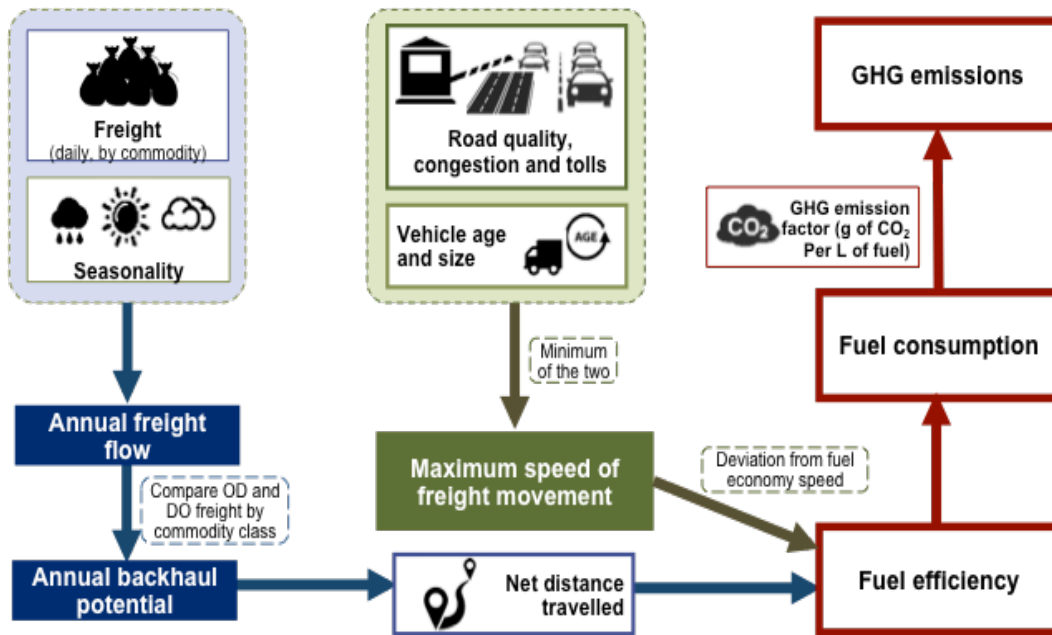
Building on the origin–destination (OD) study for seven key cities, the OD model, explained in Chapter 2, tracks the daily flow of trucks between key OD cities. Then, using a seasonality index, the model converts the data to an annual flow of trucks.

On a commodity level, the proportion of filled backhauls for each route is estimated by comparing the OD and destination–origin (DO) flows for a given commodity. This helps determine the potential filled backhauls on these routes, which helps identify the proportion of loaded versus empty trucks. Both types of trips are factored for the total distance travelled. The total distance travelled by trucks (vehicle km) multiplied by the fuel efficiency of the trucks gives the volume of fuel (diesel) consumed in liters, then multiplied by a factor of 2.64 to give kilogram of CO₂ produced.¹

Fuel efficiency, a critical factor in this model, is computed using fleet characteristics—such as truck age and truck size—as well as road infrastructure. A general trend shows an increase in the fuel consumed with an increase in truck age and size. Road infrastructure, on the other hand, has a direct impact on the net speed of freight movement, which in turn affects the fuel economy of the trucks.

The following section discuss the detailed assumptions and inputs used for the modelling; Figure 4.3, below, summarizes the GHG model development.

Figure 4.3. Framework for Estimating GHG Emissions



Source: A.T. Kearney analysis conducted as part of this study.

Inputs

This section discusses the various inputs to the GHG model, which are divided into three types:

1. **Demand-side inputs:** OD freight flow data gathered from daily truck flows, along with the conversion of that data to annual freight flows in tonnage and number of trucks
2. **Supply-side inputs:** Fleet characteristics such as different truck sizes, their respective ages and speeds as well as the fleet mix at a national level
3. **Infrastructure-side inputs:** Road infrastructure on key routes, along with congestion points due to city interactions, tolling, and the corresponding waiting times influencing the net speed of freight movement

Figure 4.4 shows a summary of the key inputs for the model.

Figure 4.4. Inputs to the Greenhouse Gas Model

	Inputs	Description
1 Demand	• Freight characteristics	• Freight movement between different regions
	• Seasonality	• Commodity-wise seasonality factor to convert daily flows to annual flows
2 Supply	• Fleet characteristics	• Age of fleet • Size of fleet • Average speed of truck
	• Fuel efficiency	• Fuel efficiency of vehicle based on size and age of fleet
3 Infrastructure	• Road quality	• Road quality in terms of % of expressway, highways
	• Congestion points	• # of towns enroute where trucks interact with local traffic • Time taken to cross such towns
	• Tolls and other stops	• # of tolls on different routes • Time taken at toll booths

Source: OD model outputs for seven key cities; unpublished data provided by the Vietnam Register (VR) and the Directorate for Roads of Vietnam (DRVN); and General Statistics Office of Vietnam: https://www.gso.gov.vn/Default_en.aspx?tabid=766.

i. Demand-side inputs

The OD freight flow model gives the daily truck flows between the following key seven cities: Hanoi, Hai Phong, Vinh, Da Nang, Da Lat, Ho Chi Minh City, and Can Tho.

These seven cities account for nearly 40 percent of the total population and nearly 55 percent of the total GDP. The OD model gives freight flow patterns for 42 OD flows. These freight flows account for approximately 40 percent of the overall intercity freight flows at the national level, and thus provides a fair sample to estimate the GHG emission efficiency of the trucking sector across the country. These daily flows are converted into annual flows using a seasonality index, calculated using the export value of goods in months across the year. On each route, commodities are compared with their OD and DO values to find the potential filled backhauls on these routes, which helps identify the proportion of backhaul trucks. Thus, the model computes the total distance trucks travel annually along the 42 routes.

ii. Supply-side inputs

Because truck fuel consumption increases with an increase in truck size and truck age, supply-side inputs are crucial in determining the fuel consumption of trucks. Table 4.2 lists the supply-side inputs. The assumptions for the variation in fuel efficiency with truck size and age are shown in table 4.3 and table 4.4 respectively. In this study, fleet mix (the proportion of trucks of each size) is taken from the Vietnam Register (VR), while the truck age for each type of truck is taken from the Directorate for Roads of Vietnam (DRVN).

The fuel efficiency of trucks depends on truck speed. Generally, vehicles have an economy speed for optimal fuel consumption. Based on A.T. Kearney research, the study model uses 35 kmph as the fuel

economy speed, with a 2.5 percent drop in fuel efficiency for every 5 kmph deviation from the economy speed.

Figure 4.5 illustrates the calculation of final CO₂ emissions using vehicle-kilometer travelled and fuel efficiency values.

Table 4.2. Supply-Side Inputs to GHG Model: Fleet Characteristics

Truck type	Truck age (years)	Market size (%)
0–5T	7.68	68%
5–10T	5.91	11%
10–20T	8.83	14%
>20T	5.82	7%

Source: Unpublished data provided by VR and DRVN.

Table 4.3. Fuel Efficiency Variation by Truck Size

Truck type	Fuel efficiency (L/100km)
0–5T	11
5–10T	18
10–20T	28
>20T	34

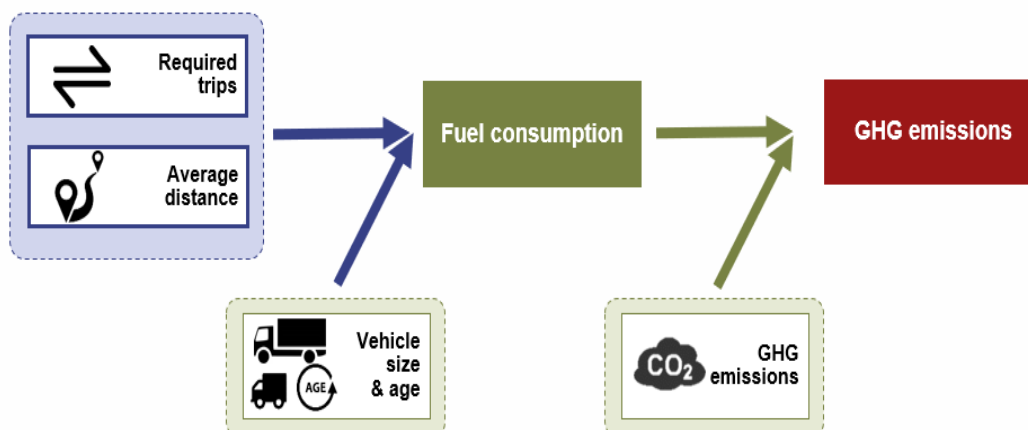
Source: Primary interviews with truck operators.

Table 4.4. Fuel Efficiency Variation by Truck Age

Truck age	Percent drop in fuel efficiency
<5 years	0%
5–10 years	1%
10–15 years	2%
>15 years	3.5%

Source: Primary interviews with truck operators.

Figure 4.5. Flowchart: Calculating Final GHG Emissions



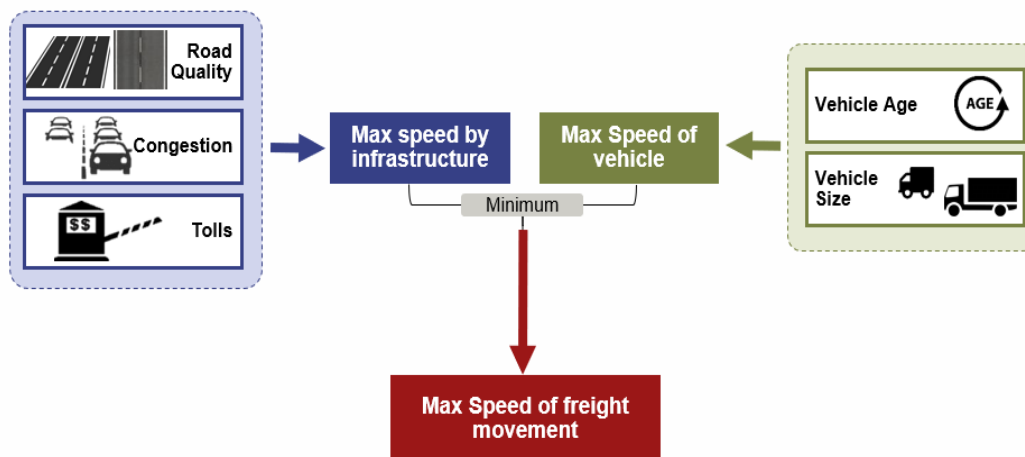
Source: A.T Kearney analysis conducted as part of this study.

iii. Infrastructure-side inputs

Calculated as the minimum of the maximum speed allowed by infrastructure and the average speed of trucks, infrastructural inputs estimate the speed of freight movement on roads. It is important to understand infrastructural factors, since they directly impact the speed of freight movement, which in turn affects fuel efficiency. In addition, higher speeds allow for more trips per truck, resulting in a higher vehicle-km and freight ton-km travelled.

The maximum speed allowed by infrastructure depends on the road quality (e.g., percentage of expressways and highways), congestion from city interactions on the route as well as the waiting time at the tollbooths (see figure 4.6). The model currently assumes highways comprise 100 percent of the routes, with a maximum allowed speed of 80 kmph. However, waiting times at city interaction points and highway tollbooths significantly reduce maximum speed. The study uses toll information provided by DRVN, with an assumed average waiting time of 30 minutes per tollbooth, based on past studies. The speed of the trucks, dependent on truck size and age, has also been taken from previous reference studies produced by A.T. Kearney (unpublished) and the World Bank (Blancas et al 2014).

Figure 4.6. Flowchart: Calculating Maximum Speed of Freight Movement



Source: A.T Kearney analysis conducted as part of this study.

Analysis and key findings

The GHG model computes the emissions from the road freight transport sector at 143 g of CO₂ per ton-km. Assuming 3 percent sales of commercial vehicles with Euro 4 norms, the carbon monoxide (CO), hydrocarbon (HC) + nitrous oxides (NO_x) and fine particulate matter (PM 2.5) emissions stand at 0.35, 0.25, and 0.03 g/ton-km respectively. Table 4.5 shows the final, tabulated results:

Table 4.5. GHG Emissions Model: Output by Pollutant Type

Pollutant type	Value (g/ton-km)
CO ₂ /GHG	143
CO	0.35
HC + NO _x	0.25
PM	0.03

Source: A.T Kearney analysis conducted as part of this study.

Table 4.6 describes a summary of the GHG model calculations, based on the OD freight flow model. The model captures GHG emissions from intercity freight flows accounting for 40 percent of the total intercity road freight movement in Vietnam (JICA 2010),² and is therefore suitably representative, on a per ton-km level, of the overall intercity trucking sector GHG emissions.

Table 4.6. GHG Emissions Model: Summary of Calculations

Parameter	Unit	Model output
Vehicle kms	kms (E+06)	3,800
Freight ton-kms	kms (E+06)	11,407
Fuel consumed	L (E+06)	616
GHG emissions	Gg	1,626

Source: A.T Kearney analysis conducted as part of this study.

In addition, the model identifies three areas that directly impact the GHG emission efficiency and form the cornerstone of policy imperatives. These three key improvement levers of GHG emissions (fleet mix, backhauling, and road infrastructure) are discussed below.

i. Fleet mix

Fleet mix includes two components: the market size of different truck types and the operations and features of the existing truck fleet on roads. With the large number of lower tonnage trucks plying intercity routes, the need for more trucks to carry the same quantum of freight increases, which leads to greater GHG emissions. Though higher capacity trucks consume more fuel and produce more emissions, they have effectively better GHG emission efficiency, as the ton-km travelled increases substantially.

In addition, for a truck operating on a highway, nearly 60 percent of the power produced is lost within the engine, with aerodynamic losses and rolling resistance contributing to the remaining 40 percent. Retrofit devices can help tackle these energy loss areas; examples include air dams, truck shape modifications like roof tapering, cab extension, etc., for reducing aerodynamic losses, green tires, and maintaining optimal tire pressure for lower rolling resistance. At the national level, modernizing engines to improve emission control systems could also potentially reduce GHG emissions. The recent adoption of Euro 4 norms is one such government initiative to lower emissions; progression toward higher Euro norms (e.g., Euro 5 or Euro 6) can further lead to better engine emission efficiencies.

ii. Backhauling

Empty backhauls and less than truckloads (LTLs) result in lower GHG emission efficiency since the trucks move on road with no- or sub-optimal loads, thereby adding to emissions. In Vietnam, limited effective freight consolidation, due to high fragmentation of the market, is a key factor contributing to the high empty backhaul rates across the country. Recently, a number of freight aggregator players have entered the industry, targeting freight consolidation. These innovative models use technology for an algorithmic, real-time matching of supply–demand, route optimization, etc., and can help in reducing backhauls as well as improving the efficiency of the truck sector in general. Freight

consolidation could also potentially find work-arounds for seasonality, and other unavoidable factors contributing to empty backhauls and lighter truckloads during certain months of the year.

Another potential reason for empty backhauls is “load specificity,” where certain trucks carry only certain commodity goods. For example, trucks that carry cement or agricultural products are often not used for any other commodity type. The use of standard truck body types in Vietnam (typically flatbed, box-type containers and special purpose trucks) can remove restrictions around truck suitability for certain commodities (specifically within break bulk commodity groups), thereby improving backhaul rates. Promoting the containerization of goods could also improve the truck utilization rates, since different commodity types can be placed adjacent to each other in a truck.

iii. Road infrastructure

Currently, the long waiting time at highway tollbooths effectively reduces the average speed of the trip. Similarly, the large number of small trucks contributes significantly to traffic congestion. Both factors add to the total trip time, ultimately limiting the amount of freight trucks can carry in a year.

Better road quality and less traffic congestion can enable the trucks to complete the trip in less time, and eventually increase the number of annual trips and the total ton-kms. Dedicated truck lanes on highways, electronic tolls on key highways, and other infrastructural upgrades, could not only help reduce the transit time, but also help trucks maintain an optimal speed for lower GHG emissions.

Way Forward

In coming years, freight flow in Vietnam is expected to grow; the top three commodities in the OD model, accounting for nearly 40 percent of the flows, are already experiencing an annual growth rate of about 10 percent. Roads, as the backbone of freight transport, will be the key contributors to GHG emissions by the transport sector, with the trucking sector currently estimated to contribute 4 percent of Vietnam’s total GHG emissions.

Formulating policies to introduce investments in green transport technologies will be important, as will innovating ideas to modernize and adapt trucks to be more efficient and eco-friendly. This requires establishing logistics innovation centers and revising the driver-training curriculum. Additionally, a country-wide fleet modernization program to replace the aging fleet with a younger, more fuel-efficient fleet could be a major step forward.

According to statistics from the Vietnam Register, the number of environmentally friendly vehicles operating in Vietnam is limited and most are imported. Records show that from 2010 to 2017, approximately 1,229 hybrid cars and seven electric cars entered the Vietnamese market. Government policies to promote the adoption of environmentally friendly vehicles could help boost market and consumer interest in greener vehicles.

Summary

- As a signatory of the Paris Climate Agreement since 2016, and the UN Framework Convention on Climate Change (UNFCCC) since 1992, the Vietnam government targets an 8 percent reduction in the stated GHG emissions by 2030. The GHG emissions from the road freight sector contribute an estimated 4 percent of overall GHG emissions produced in the country.
- Building on the origin–destination (OD) model explained in Chapter 2, the study’s GHG emissions model aids understanding of the key improvement levers of GHG emissions in road freight transportation.
- The GHG model includes demand-side, supply-side, and infrastructure-side inputs:
 - **Demand-side inputs:** OD freight flow data gathered from daily truck flows, along with the conversion of that data to annual freight flows, in tonnage and number of trucks
 - **Supply-side inputs:** Fleet characteristics such as truck sizes and their respective ages and speeds as well as the fleet mix at a national level
 - **Infrastructure-side inputs:** Road infrastructure on key routes, along with congestion points due to city interactions, tolling, and the corresponding waiting times influencing the net speed of freight movement
- The GHG model computes the emissions from the road freight transport sector at 143 g of CO₂ per ton-km. Assuming the 3 percent sales of commercial vehicles with Euro 4 norms, the CO, HC + NO_x and PM2.5 emissions stand at 0.35, 0.25, and 0.03 g/ton-km respectively.
- The key improvement levers with a direct impact on the GHG emissions include truck tonnage, the country’s fleet mix, backhaulings, and road infrastructure (e.g., the impact of truck speed on roads).

Notes

1. Calculated based on combustion of carbon in diesel fuel.
2. Values extrapolated to 2017 using commodity growth rates.

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Chapter 5: Policy and Investment Options

Policy interventions are important to support the trucking sector due to its strategic importance for Vietnam; the Government of Vietnam (GoV) has already been working toward reducing logistics costs and emissions through various initiatives, including the ICD Master Plan 2020 to develop inland container depots, the Seaport Development Plan 2020–2030, and formation of special economic zones (SEZs) and industrial parks, etc.

Based on a comprehensive operational assessment of the Vietnam trucking sector, including a ground-up OD freight flow model, trucker cost build-up, and the GHG emissions model, the study defined policy imperatives to improve the efficiency of the trucking sector along four key dimensions: infrastructure, supply, demand, and processes (figure 5.1).

- **Infrastructure:** Policies in this area aim to improve core and supporting infrastructure for intercity trucking and reduce the load on roads by encouraging integration with other modes of freight transport.
- **Supply:** Policies in this area focus on the supply side of the industry, including the truck fleet, truck operators, truck drivers, and logistics companies.
- **Demand:** Policies in this area focus on improving the supply-demand match for truck operators in the industry, which leads to higher truck utilization and enhanced organization of the demand.
- **Processes:** Policies in this area aim to streamline the entire transportation process for truck operators or logistics companies.

Figure 5.1. Summary of Key Policy Options to Improve Trucking Sector Efficiency in Vietnam

Infrastructure	Supply
1 Reduce truck congestion around ports	6 Introduce a fleet modernization program
2 Promote 'Container on Barges' to boost IWT usage	7 Vary the existing road user charge with truck age
3 Promote coastal shipping on North-South Vietnam route	8 Strengthen driver training and licensing processes
4 Integrate urban consolidation centers and logistics centers in the ICD plan	9 Improve the fleet through a growth-based lending program
5 Prioritize and upgrade key road infrastructure	10 Set up cooperatives for truck owner-operators
Demand	Processes
11 Promote brokerage firms for demand-supply matching	13 Launch an issue resolution mobile app
12 Increase investments in digital aggregator models	14 Roll out of E-tolling and CCTVs at toll booths

Infrastructure-Related Policy and Investment Options

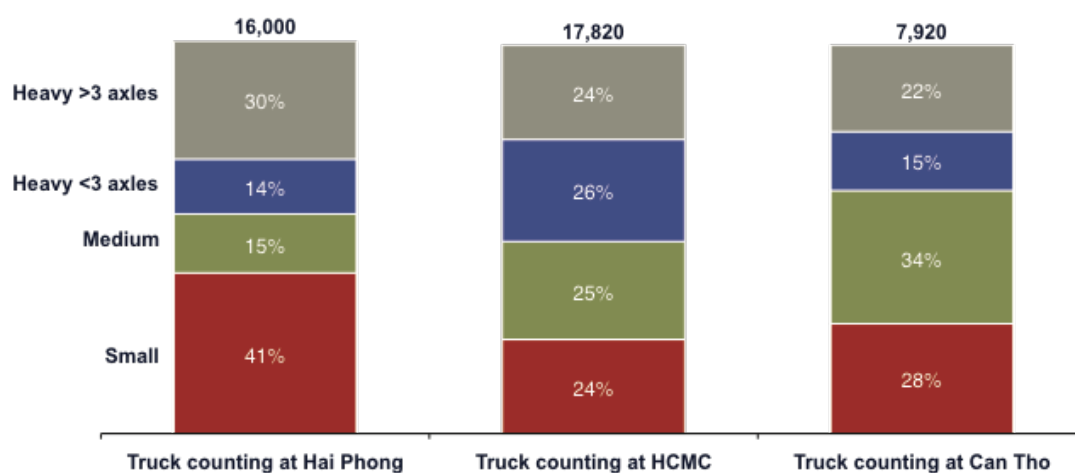
Infrastructure policy options focus on ports and road infrastructure as well as the supporting infrastructure, such as logistics centers, for a seamless multimodal transportation of goods in Vietnam. Total logistics costs and GHG emissions can be reduced by taking a holistic view—of not only directly improving the trucking sector, but also of promoting multimodal transport and a more sustainable transport network. With a focus on coastal shipping, inland waterways, road upgradation, and consolidation centers, the policy proposals aim to reduce congestion around ports and on key roads.

1. Reduce truck congestion around ports

i. Current challenge

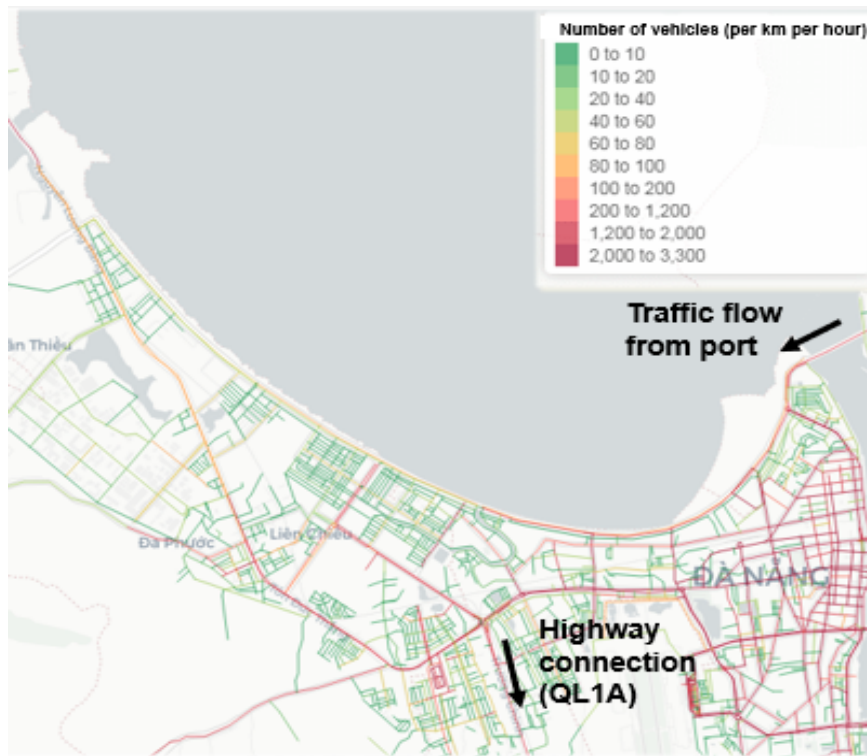
According to the Directorate for Roads of Vietnam (DRVN) manual truck-counting stations, small- and medium-sized trucks make up 50 to 60 percent of trucks moving in and out of the key ports of Hai Phong, Ho Chi Minh, Da Nang, and Can Tho (figure 5.2). Trucking companies report relatively low road capacity in the immediate vicinity of some ports, which, in some instances, can handle only 10–15 tons of load. As a consequence, truck operators tend to use smaller trucks for last-mile connectivity to ports. Unsurprisingly, the larger proportion of smaller trucks results in more trucks on roads and increased traffic congestion into and out of these ports—located in city interiors—compounding the delays in transit time, especially for intracity deliveries. The suggested policy interventions aim to reduce the transit time for the trucks by improving the road infrastructure around the ports. For example, targeted interventions to reduce transit time by an estimated 5 percent could lead to a 2 percent reduction in the overall transportation costs¹ for truck operators (keeping other factors constant). Figures 5.3, 5.4, and 5.5, illustrate the congestion levels, in terms of truck volume flows and commercial vehicle tracking system (CVTS) traffic density around major ports.

Figure 5.2. Truck Flow Recorded at DRVN Manual Counting Stations near Ports



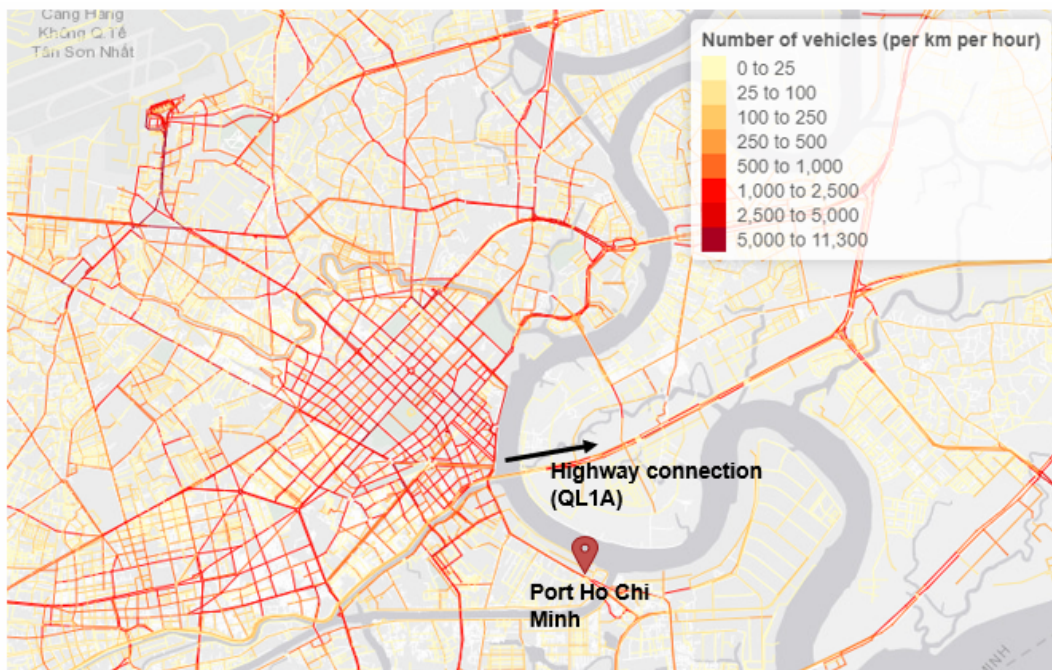
Source: Unpublished data provided by the Directorate for Roads of Vietnam (DRVN).

Figure 5.3. Traffic Density Representation Using CVTS Data: Da Nang Port



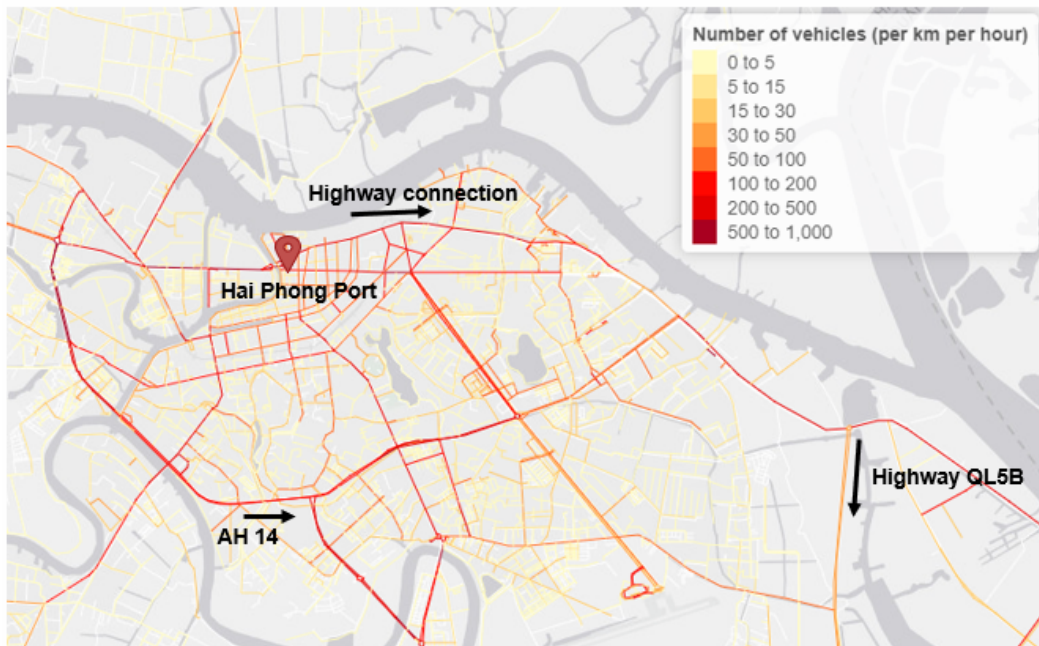
Source: Unpublished data from the commercial vehicle tracking system (CVTS), provided by DRVN.

Figure 5.4. Traffic Density Representation Using CVTS Data: Ho Chi Minh Port



Source: Unpublished data from the CVTS, provided by DRVN.

Figure 5.5. Traffic Density Representation Using CVTS Data: Hai Phong Port



Source: Unpublished data from the CVTS, provided by DRVN.

ii. Proposed policy

Due to the high truck volumes near ports, expanding road capacity of port access roads as well as providing dedicated areas for freight consolidation and parking near the ports could potentially reduce the traffic near ports. The proposed policy describes various short- and medium-term measures to improve road connectivity to ports. The proposed short-term initiatives focus on road congestion in the immediate vicinity of ports:

- Provision of a centralized truck parking bay near the ports for idle trucks awaiting goods/clearance
- Construction of cargo consolidation yards to reduce less-than-truckload (LTL) trucks and consolidate freight, thereby reducing the number of trucks

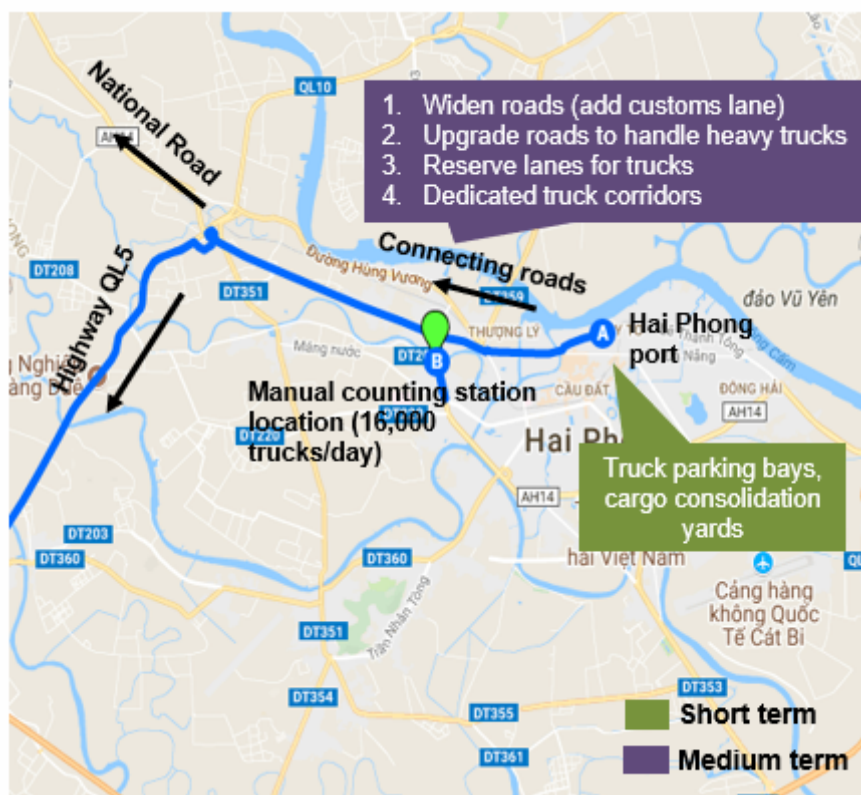
According to a 2018 survey conducted by the General Department of Customs in Hai Phong, most of the enterprises involved in the export-import trade have to quarantine their products. Therefore, the goods are not allowed to clear immediately and must wait to be inspected by specialized agencies. In addition, the Port of Ho Chi Minh City (HCMC) has reported thousands of cargo loads awaiting their consignees, which adds to port congestion. According to the HCMC customs data, some goods await clearances for more than 90 days from the date of arrival, highlighted the need to augment parking spaces in the port vicinity. The proposed parking bays could be used to store the truck inventory, thus reducing traffic. Moving some cargo consolidation yards (currently located in distant ICDs) to strategic locations nearer to ports could potentially aggregate outgoing freight, and lead to fewer trucks on port access roads.

Medium-term policy suggestions target the traffic reduction, on typically longer stretches of port-to-city roads that require more funds and planning for construction and implementation. The medium-term recommendations include the following:

- Widening roads and adding a separate express customs lane for cross-border goods
- Upgrading port access roads to handle heavier loads and larger trucks
- Reserving lanes for medium and heavy commercial vehicles on existing roads connecting ports to the nearest city
- Constructing new dedicated truck corridors on port access roads

Figure 5.6 provides an illustrative example of the suggested policy design.

Figure 5.6. Reducing Road Congestion around Ports: Illustrative



iii. International examples

In countries around the world, dedicated truck lanes have successfully reduced road congestion. A few case examples:

- **United States:** The 50 km New Jersey Turnpike has been expanded into two separate roadways, resulting in a dual-dual facility where large trucks are restricted to the outer roadway. Other dedicated truck lanes under planning and construction include Clarence Henry Truckway in New Orleans, Louisiana; the South Boston Bypass Road; and the Los Angeles I-5 truck bypass lanes. A feasibility study on the I-70 corridor—spanning approximately 1,300 km across the states of Missouri, Illinois, Indiana, and Ohio—projects travel efficiencies worth US\$12,000 million in 15 years post construction (U.S. DOT and FHWA 2010).
- **China:** The “Green Lane” project, a cross-boundary trucking initiative, is designed to simplify the customs clearing between Hong Kong and South China, and to reduce cross-boundary trucking costs. The Shenzhen–Hong Kong Logistics Green Lane runs 51 km from Hong Kong’s Kwai Chung Container Terminal to the South China International Logistics Center (SILC) in Shenzhen. Cross-boundary trucks use the dedicated “green lane” at the Huanggang boundary checkpoint, equipped with real-time GPS tracking, thus eliminating lengthy stops for customs documentation procedures. The dedicated lane has increased the number of trips per day, per truck, between Hong Kong and SILC by an estimated 50 percent, with an average savings of HK\$500 for Dongguan-based companies (HKSC 2006).

2. Promote “container on barges” to boost IWT usage

i. Current challenge

Currently, only 50 percent of the total inland waterway transport (IWT) network, in km, is navigable in Vietnam (VIWA 2017), with many shippers preferring the point-to-point flexibility of trucking. However, standardized containerization, which encourages inter-modal transfers, could promote greater multimodal transport. Traditionally, IWT usage in Vietnam has been limited to bulk commodities, such as coal, construction materials, fertilizers, and cement. Other major road freight commodities could potentially be containerized and transported through IWT. Rice offers an example of a commodity with significant potential for containerization; currently, only 4 percent of rice production in the Mekong Delta region is containerized.

Containerized barge services offer the following potential benefits:

- Easier warehousing, due to standard stacking properties
- Faster transshipment, and therefore lower terminal turnaround times, due to equipment standardization
- Less spoilage and damage to cargo, due to safer packaging in containers
- Better future multimodal integration with container trucks and the largely containerized maritime shipping
- Easier freight consolidation, since different cargo types can be packed in container units. Bulk cargo, on the other hand, requires similar cargo to be packed together

Recent container services started in the Mekong Delta region have shown positive results. Tan Cang Saigon General Company, established by the Saigon Newport Corporation, reports that cargo transported by barge from the Mekong Delta ports to Cat Lai port in HCMC reduces costs by approximately 7 percent for each 40-foot container; for each 30-foot container, costs reduce by about 20 percent.²

In general, IWT ports in Vietnam do not have adequate container-handling facilities; approximately 15 percent of cargo landing stages do not have operational permits and are unsafe (VIWA 2017). Because the north has no inland container port for loading and unloading containers at river ports, container cargo is mainly transported by road to industrial parks and export processing zones (MoT 2018). As a result, IWT moves only 15 percent of cargo from Hai Phong port and about 35 percent of container flows in the Mekong Delta region (CHP 2017; UNESCAP 2017).

ii. Proposed policy

This policy proposal aims to promote container traffic on barges on the IWT networks in the Red River Delta and the Mekong Delta regions to reduce the freight load on roads. Currently, the transportation of containerized goods on barges remains low, due to limited waterways, which are able to handle only small vessels. More than 50 percent of national waterways are Class 3, which can handle 100–300 DWT vessels. This, in turn, limits private sector investments in improved local barge designs, larger container capacities of vessels, and the low number of container terminals at river ports with adequate cargo-handling equipment. This policy proposes:

- To improve IWT fleet size and design: With an average age of more than 30 years, the current fleet in Vietnam is rapidly aging. Further, the typical cargo vessel size, around 100 DWT, is much smaller to the average 2,400 DWT vessel size of countries with well-established IWT networks, such as the Netherlands, Germany, and Belgium (Blancas and El-Hifnawi 2014). The low height of bridges represents a major hindrance to the use of larger barges with higher container capacity. Improvements to the waterway infrastructure to increase vertical clearances of bridges, particularly on the Duong bridge in the north for the Viet-Tri to Hai Phong route (Loan 2017) and on bridges along the An Giang to HCMC route, could encourage private companies to establish container services. Further, the older barges, designed for dry

bulk cargo, are not optimized for container traffic. The designs of European barges, which have much lower water drafts than Vietnamese barges, could be adopted for routes with infrastructural constraints, such as the Mekong Delta region.

- To improve container handling facilities at river ports: Currently, most river ports in Mekong Delta region are not equipped for container handling (Duc 2018). In addition, the lack of last-mile connectivity also discourages transport companies from using IWT networks. In order to move containers from vessels onto trucks, ports require terminals and container handling equipment, such as gantry cranes and forklift trucks, to ensure the smooth transfer of goods.

Priority ports and channels for the implementation of this proposed policy include the Hanoi–Hai Phong route and the Can Tho–HCMC route, thanks to the high traffic flows on these routes (15 percent and 5 percent, respectively, of overall intercity freight flows in the country).

iii. International examples

The ports of Germany, Netherlands, and Belgium are well known for their world-class logistics facilities and the IWT network around the Rhine and Danube rivers is one of the best developed waterways in the world. In fact, ships or barges with sea-gauge capacities of 800–1500T can easily navigate the river waterways, stacking up to three containers abeam and carrying up to 100 containers. Push boats, pushing up to four barges (in a 2×2 combination), increase transport capacity to 500 twenty-foot equivalent units (TEUs). Equipment for container handling in river port terminals consists of quayside container cranes for servicing ships and other storage facilities, such as manually controlled gantry cranes (Rail Mounted Gantry crane, or RMG, servicing the railway terminal), mobile cranes (Rubber Tire Gantry crane, or RTG, a straddle carrier), fork-lifters, and reach-stackers (Georgijević and Zrnić 2006).

Germany, a constant innovator in port and fleet modernization, has recently patented the Port Feeder Barge, a self-propelled container pontoon with a capacity of 168 TEU. The pontoon comes equipped with its own state-of-the-art container crane mounted on a high column. This new type of vessel can shuttle containers within ports and can also handle containers from inland barges independently from quayside equipment (Malchow 2014).

3. Promote coastal shipping on the north–south Vietnam route

i. Current Challenge

Today, domestic cargo transportation through coastal shipping is limited in Vietnam, accounting for only 39 percent of the total coastal cargo throughput,³ in part due to the absence of a robust supply ecosystem as well as infrastructural constraints in and around the ports. On the supply side, very few shipping services offer coastal shipping, passing the additional costs, e.g., terminal handling charges (which account for 50 percent of the total coastal shipping costs), along to the client. Currently, terminal handling charges are uniform for both international and domestic cargo.

Ports have traditionally preferred international cargo over domestic cargo, in terms of turnaround time and berth allocation. Lower terminal charges and the allocation of specific berth capacity and timeslots for domestic coastal shipping would encourage more domestic shipping via coastal routes. VINALINES is among the few operators currently offering scheduled services for North Vietnam–South Vietnam (N–S) coastal shipping (World Bank 2014).

A shipping exchange platform to match demand and supply and publicize information on shippers' demand and shipping rates would facilitate and encourage operators to provide more coastal shipping services.

On the infrastructural end, while the major export-import oriented ports are being developed with latest facilities for cargo handling, additional policy support could be used to promote Roll on/Roll off (RO-RO) vessels with built-in or shore-based ramps. This would enable loaded trucks to roll directly onto ships, transfer through the sea, and then roll off from the ships to the ports. These trucks can then directly proceed to delivery, reducing dependencies on port handling services and dedicated short-haul truck services. Currently, RO-RO ships account for 0.04 percent of the cargo throughput from the HCMC Port (JICA 2010a).

ii. Proposed policy

This proposed policy aims to promote domestic shipping services, and facilitate the establishment of necessary port infrastructure, to increase the use of coastal shipping on the north–south route, thereby reducing the traffic flow on National Highway No. 1 and National Highway No. 5. The key features of the proposed policy are outlined below:

- Market Regulation:
 - Reduce domestic cargo handling charges, as compared to the current standard charges for all cargo freight (a common practice in other countries) and allocate berthing windows in key ports for domestic shipping lines.

The policy also recommends setting up domestic shipping centers in the key provinces of Hai Phong and HCMC to support coastal shipping for domestic cargo. These centers could include the following key functions:

- i. Increase awareness of domestic coastal shipping among shippers, forwarding agents, and shipping agents

- ii. Create awareness of government programs that may assist private companies in developing domestic shipping lines
 - iii. Analyze the problems and bottlenecks in domestic coastal shipping and act as a think tank for developing solutions to combat those issues
 - iv. Establish a shipping exchange platform that can help match demand and supply, and publicize information on shippers' demand and shipping rates.
 - v. Encourage greater cooperation at a national level between provincial administrations and private enterprises to spur development of sustainable domestic shipping
- Infrastructure upgradation:
 - Establish a maritime development fund for the financing and purchasing of RO-RO and smaller container ships more suited to moving domestic cargo

Currently used for import-export, the shallower ports of Hai Phong and Cat Lai ports place a restriction on the size of vessels that can be handled. Every year, about 1.2 million TEUs are transhipped in other overseas ports, resulting in an opportunity loss for the Vietnam port industry of up to US\$13 million (JICA 2013). While these two ports are appropriate for domestic cargo operations, the international cargo handling could gradually move to the deep-water ports of Lach Huyen and Cai Mep.

The implementation of RO-RO facilities can be integrated as part of the Vietnam Master Plan 2020 (Circular 2190/QD-TTg), with Hai Phong and Cat Lai marked as priority ports, whose supporting road infrastructure also needs to be strengthened, as mentioned in the section on Supply Factors, found in Chapter 2.

iii. International examples

To shift freight load from roads (particularly to sea), the European Commission (EC) has focused on "Short Sea Shipping" (SSS) for intra-European trade. The European Union (EU) has invested heavily in RO-RO shipping units, which account for about 13 percent of the total SSS freight transport (ECSA 2016).

With a view to promoting SSS, shortsea promotion centers (SPC) have been established in nearly all coastal EU member states. The EC encourages the coordination of the SPCs at a pan-European level, within a European Shortsea Network (ESN). In 2003, the EU included the concept of Motorways of the Sea (or MoS) in the Tran-European Network (TEN-T), making its development a priority project in the EU transport policy. As a case example, in Spain, Real Decreto Legislativo 2/2011 of ports analyzes the special conditions of regular SSS services, giving a favorable tariff treatment to SSS and MoS. This law has resulted in 41 shipping companies operating 61 regular services in Spain with a frequency of 1.34 departures per week and has expanded to nearly 100 ports, directly or indirectly.⁴

By 2050, SSS is expected to play a key role in reaching the EU transport goal of reducing 60 percent of greenhouse gas emissions generated by transport, and by 2030, shifting 30 percent of road freight over 300 km to other modes. The European Commission will focus on three main priority areas in order to enhance the further development of Short Sea Shipping:

- i. Simplify administration
- ii. Support the industry in adopting new technologies for complying with new and stricter environmental legislation
- iii. Integrate SSS in full logistics chains

4. Integrate logistics and urban consolidation centers in the ICD master plan

i. Current challenge

Logistics centers, integral for supporting logistics activities as they assist to consolidate and deconsolidate cargo, can also offer value-added services. Services such as simple warehousing and storage essentially mirror the basic services offered by an ICD in Vietnam, along with additional services. As reported by transporters, the value add from ICDs is very limited; with customs clearance centers already established within industrial zones, transport operators often bypass the ICDs to avoid the high fees and congestion. Because land acquisition is often a key challenge to setting up new infrastructural facilities, upgrading the key existing ICDs into logistics centers—with their state-of-the-art warehousing facilities and other value-added services—would attract truck operators and promote consolidation of cargo and higher efficiencies. This suggestion is further detailed in the next section.

Urban consolidation centers (UCCs)—dedicated areas where trucks can park and re-arrange cargo for distribution in the city—are more focused on urban and intracity deliveries. Typically situated in the city outskirts, UCCs can enable consolidation or breakdown of cargo moving into or out of the city.

Apart from managing the urban traffic, UCCs, particularly around Hanoi, can also act as distribution centers for goods imported from Hai Phong. Since many importers have their office and storage spaces in the Hanoi city center, the imported goods are first brought to Hanoi from Hai Phong, and then shipped to various retailers across Vietnam. Understandably, this causes traffic congestion within Hanoi. However, UCCs could allow trucking companies to bypass the city, with the storing and packaging done in less congested areas. Hanoi and HCMC have been tapped as the top priority cities for establishing UCCs, due to the high concentration of economic activity in these areas (45 percent of the GDP), and approximately 60 percent of the freight moving within the region. As the number of private vehicles increases due to population growth and greater affluence, UCCs can also help control and streamline freight traffic and reduce congestion. With a majority of online consumers concentrated in these regions, UCCs would also support e-commerce logistics, a growing industry in Vietnam.

The current ICD master plan lists 31 inland cargo depots. Since land acquisition is usually a challenge for attracting new investments in logistics centers and UCCs, proposed plans should highlight the key ICD locations that could serve the functions of logistics centers and UCCs, and thus help reduce the logistics costs and congestion on roads.

ii. Proposed policy

According to Decision No. 2223/QĐ-TTg, the master plan for the development of Vietnam's dry ports system to 2020, development will optimize the transportation of goods on the main transportation corridors, especially containerized cargo transport to and from the seaports in Hai Phong, HCMC, and Vung Tau (Cai Mep-Thi Vai port). The proposed policy aligns with the master plan, highlighting the upgrade of ICDs as logistics centers/UCCs, according to regional demands. As per the master plan, 31 ICDs will be upgraded or established (14 in north, 12 in south, and five in the central region). With the high number of industrial zones (IZs) in the north and south, table 5.1 and table 5.2 list the ICDs holding the most potential as state-of-the-art logistics centers (offering value-added services), along with their key characteristics.

Table 5.1. Key Characteristics of Proposed Logistics Centers in the North

ICD name	Nearest port	Nearest road connection	River connection	Number of industrial zones in province
Hương Canh ICD	Hai Phong	Expressway connectivity at 700m	Hong river	26
Phuc Loc ICD	Hai Phong	Highway connectivity at 900m	Day river	21
Hai Duong ICD	Hai Phong	Highway connectivity at 100m	–	20

Source: TDSI 2016.

Table 5.2. Key Characteristics of Proposed Logistics Centers in the South

ICD name	Nearest port	Nearest road connection	River connection	Number of industrial zones in province
Ben Luc ICD	Cai Mep	Highway connectivity at 2 km	Vam Co Dong River	42
Long Binh new ICD (known as Tân Cảng ICD)	Cat Lai	Highway connectivity at 300m	Dong Nai	35
Tin Nghia ICD	Cat Lai	Highway connectivity at 100m	None, but railway at 500m	35

Source: TDSI 2016.

In addition to basic ICD services offered in logistics centers, the value-added services could include the following:

- Warehousing (different types of warehouses—for example, general warehouses for storage, warehouses with raised docking bays, and air-conditioned warehouses)
- Commodity-specific storage conditions (regulated temperature, indoor/outdoor)
- Equipment handling (crane, forklift, timer racks, pallet racks, lift truck, etc.)
- Intermodal terminals, to facilitate transfers between trucks and IWT
- Areas for parking and loading/unloading operations
- Clearances by customs and other cargo approval agencies
- Public facilities, such as post offices/public telephones/bus services
- Restaurants and cafés
- Petrol station with vehicle washing facilities
- Repair workshops for trucks, containers, and other equipment
- Information systems to facilitate intermodal transfers and demand-supply matching for transport services

With these value-added services, the proposed logistics centers can attract trucks currently bypassing ICDs. The centers would act as a converging place for the less than truckload (LTL) trucks carrying goods produced by the industrial zones, and consolidate the goods into larger trucks to be moved over long distances through roads, rail, and waterways.

Urban consolidation centers (UCCs), on the other hand, focus on urban deliveries to reduce city congestion. As listed in table 5.3, the following ICDs—located closer to city centers of Hanoi and HCMC—make good candidates for upgrading into UCCs:

Table 5.3. ICDs Proposed for Upgrading to Urban Consolidation Centers

ICD name	Nearest city	Distance from city center (km)	Nearest road number (distance in km)
Hoài Đức ICD	Hanoi	16	NH32 (0.2km)
Phù Đổng ICD	Hanoi	20	NH1 (0.8 km)
Tiên Sơn ICD	Hanoi	35	NH1 (0.1 km)
Long Binh ICD	HCMC	30	NH1 (1.5 km)
Song Than (new ICD)	HCMC	25	Province road 743 (0.1 km)

Source: TDSI 2016.

Integrating the UCCs into the ICDs implies keeping a separate storage area for deliveries into the city. The key functions of the UCCs would be to:

- Break down the bulk cargo into smaller trucks better able to enter the city
- Consolidate movement of outgoing small trucks on highways
- Coordinate and consolidate cargo going to the same destinations in the cities, to reduce city traffic
- Consolidate LTL trucks into full truck load (FTL) trucks to reduce the number of trucks on roads
- Provide parking areas for trucks arriving during the cities' restricted truck-travel hours

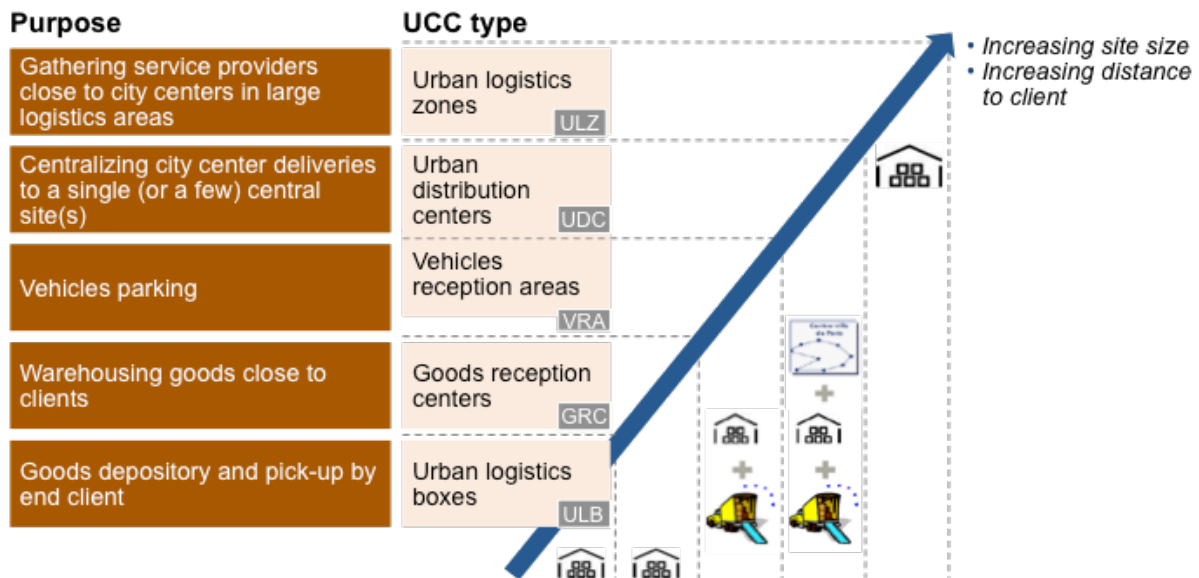
An illustration of the proposed policy for UCCs is shown in figure 5.7.

A combination of UCCs and logistics centers will help consolidate road freight onto larger trucks for long-haul trips and streamline short-haul trips into smaller trucks, to reduce congestion in and around key economic nodes in Vietnam. Overall, this infrastructure can help improve the efficiency of trucking operations in Vietnam. Figure 5.8 illustrates the different types of UCCs that can be developed depending on the site size and distance to the client.

Figure 5.7. Urban Consolidation Centers at City Fringes: Illustrative



Figure 5.8. Purposes and Types of Urban Consolidation Centers



iii. International examples

This section discusses a few case examples of UCCs, a relatively new concept in Vietnam.

- **Japan:** Joint delivery systems with UCCs have been established near cities such as Tokyo, Osaka, and Fukuoka. The centers, located in specific districts or wards on the outskirts of the city, serve various purposes. For instance, the UCC at Tenjin, near Fukuoka, focuses on delivery to convenience store chains, while the UCC at Motomachi, near Tokyo, delivers goods to retail shopping districts. The establishment of UCCs has helped in reducing delivery time, delivery cost, congestion, and negative environmental impacts. The UCC ownership is largely private but the government provides support such as providing dedicated parking spaces, etc.
- **United Kingdom:** The Bristol City Council, in partnership with DHL Exel, has been successfully operating a consolidation center, to help reduce pollution and congestion in central Bristol. The scheme focuses on Bristol's core retail area Broadmead and the UCC, located seven miles from the target city center area, offers approximately 5,000 sq. ft of warehousing space.
- **Singapore:** The government is collaborating with logistics operators to provide offsite consolidation centers (OCCs), similar to UCCs. OCCs are designed to boost efficiencies by consolidating last-mile deliveries going to the same (or nearby) shopping malls or other delivery destinations. After retail delivery trucks with LTL drop off their cargo, the OCC operator sorts and consolidates the merchandise before delivering the goods to their

destinations. In this way, goods can be delivered in full truckloads within the stipulated delivery period, reducing the number of trucks going to the same destination and improving truckload utilization.

5. Prioritize and upgrade road infrastructure

i. Current challenge

Based on the OD model illustrated in Chapter 2, eight key routes have been identified which account for approximately 30 percent of intercity freight flows in the country:

- Hanoi <--> Hai Phong (125 km)
- Hanoi <--> HCMC (1,600 km)
- HCMC <--> Can Tho (200 km)
- HCMC <--> Da Lat (300 km)

Trucks access the key routes via National Highway Nos. 1, 5, and 20. Though expressway connectivity exists between Hanoi and Hai Phong, toll charges have resulted in limited usage. The remaining routes are connected by more highways—highway tolls are approximately 50 percent less than expressway tolls—however, expressway projects for these, too, are in the pipeline.

The CVTS data also shows high congestion areas along the eight routes. As reported by transporters, a trip between HCMC and Hanoi takes nearly two days, traveling at an average speed of 35-40 kmph, with delays caused by bottlenecks at tollbooths, congestion in urban hubs, and traffic on key stretches. These key routes transport significant volumes of commodities (see table 5.4), which have an average growth rate of 6 to 13 percent. Thus, it is important to prioritize and upgrade the routes to accommodate the higher volumes expected in future. Construction of multilevel roads and removal of congestion points on the corridor network are expected to improve the average road speed and, as a result, improve the fleet utilization in Vietnam.

ii. Proposed policy

Since road infrastructure forms the backbone of the freight transportation in Vietnam, the proposed policy recommends the following infrastructural upgradation for the eight key routes mentioned in the above section, which could be prioritized in the master plans for infrastructure:

- Elevated roads to improve freight transport
- Overpass or elevated roads port-access routes to avoid traffic jams
- Additional lanes on highways to reduce congestion
- Reserved lanes to segregate commercial and passenger traffic
- Active traffic management using CVTS data
- Accelerated roll-out of e-tolling to reduce transit time

Table 5.4. Commodity Flow Analysis on Key Origin–Destination Routes

Route	Two-way truck volume flow	Top three commodities (percent of total flow on route)
Hanoi ↔ Hai Phong	44 kT/day	Wood, paper, and furniture (20%)
		Food products and beverages (18%)
		Clothing, textile, and footwear (12%)
Hanoi ↔ HCMC	17 kT/day	Food products and beverages (31%)
		Electronics and electric equipment (10%)
		Fruits and vegetables (9%)
HCMC ↔ Can Tho	15 kT/day	Rice and crops (28%)
		Iron and steel (14%)
		Food products and beverages (14%)
HCMC ↔ Da Lat	10 kT/day	Food products and beverages (36%)
		Fruits and vegetables (25%)
		Other agricultural products (12%)

Supply-Side Policy and Investment Options

Supply-side policy options focus on improving the age and fuel efficiency of the national truck fleet, truck driver behavior, and sector organization in the industry, thereby impacting the supply components of road freight transportation—namely, the truck fleet, drivers, and the transportation companies.

6. Introduce a fleet modernization program

i. Current challenge

According to the Vietnam Register’s database (accessed on May 31, 2018), in Vietnam, 95 percent of the truck fleet is older than five years, with 31 percent of its fleet older than eight years. While older trucks add to operator transportation costs, newer trucks are 1 to 2 percent more fuel efficient and require less on-road maintenance, thanks to fewer breakdowns (compared to a five-year-old truck). Additionally, due to the higher fuel consumption by older fleet, GHG emissions have a direct correlation with truck age.

Implementing a nationwide fleet modernization program could encourage replacement of the older fleet with newer trucks, which will lower transportation costs and GHG emissions. Euro 4 rolled out in Vietnam in 2018, and a modernization program could accelerate the adoption of Euro 4 in the truck

fleet. An estimated 20 percent shift in the fleet from Euro 2 to Euro 4 would produce a 14 percent reduction in carbon monoxide (CO), a 16 percent reduction in hydrocarbon (HC) + nitrous oxides (NO_x), and a 14 percent reduction in particulate matter (PM), in g/km.

Given that 75 percent of trucking companies general annual revenue less than US\$1 million,⁵ many prefer older, second-hand trucks, up to 50 percent less than a new truck in the same class. This, in turn, leads to a propagation of older, less fuel-efficient trucks in Vietnam.

ii. Proposed policy

As an initiative to control the GHG emissions, a fleet modernization program encourages truck owners to replace older vehicles with new trucks. As per the proposed policy, truck owners with fleets complying to Euro 2 standards (or older) may receive monetary benefits to scrap their older vehicles and incentives for purchasing replacement vehicles, which would conform to the current Euro 4 norms. The Vietnam Register (VR) database could be used to monitor progress of the program. As illustrated in figure 5.9, the incentives for truck owners proposed in this policy include the following:

- Incentives from the government: A fixed proportion of the registration tax would be waived on the purchase of a new truck
- Rebates for scrapping older vehicles: An additional fixed percentage of the value of a truck scrapped at an authorized recycling center would be paid to the customer as a rebate upon purchase of a new truck
- OEM discounts: The government would promote discount deals from original equipment manufacturers on purchases of new trucks bought under the fleet modernization program

Figure 5.9. Owner Incentives for Scrapping Old Vehicles





iii. International examples

Fleet modernization programs, where governments incentivize scrappage of older vehicles, have been implemented in many countries. Two examples include scrappage programs in Germany and China (see figure 5.10):

- Vehicle scrappage program (Germany):** The German program targeted light duty vehicles, composed of both passenger vehicles (PVs) and light commercial vehicles (LCVs = maximum weight of 3,500 kg, designed for transportation of goods (Mock 2014)) at least nine years old. Moreover, the program mandated the replacement vehicle should be less than one year old and compliant with Euro 4 emission standards. The program offered participants a EUR 2,500 financial incentive (approximately 10 percent of the average price of a standard-sized car, approximately 20 percent for a small car) (Posada, et al 2015). In addition, participants also received the scrap value for their old vehicles. The scrappage program successfully retired around two million vehicles in one year (Kaul et al 2012). In addition, the average carbon dioxide (CO₂) value for new cars (in g/km) purchased under the program was 8 percent below the average value for non-incentivized new car purchases (ECCC 2011).
- Beijing scrappage program (China):** In 2008, Beijing, China, implemented a scrappage program with the primary objective of improving the city’s air quality. The program in Beijing targeted yellow-label vehicles—for example, Euro 0 gasoline vehicles (pre-2000), and Euro 0, 1 and 2 diesel vehicles (pre-2008). The program offered incentives for scrapping to ensure sufficient participation, and in 2009 and 2010, the government successfully scrapped approximately 150,000 yellow-label vehicles.⁶ Thanks to the scrappage program and other complementary policies, such as setting mandatory vehicle age limits, from 2008 to 2009, Beijing saw NO_x emissions reduced by almost 32 tons per day, CO emissions by 245 tons per day, HC emissions by 35 tons per day, and PM emissions by 3 tons per day (Posada et al 2015).

Figure 5.10. Vehicle Scrappage Programs in Germany and China

Country	Number of vehicles impacted	Environmental impact
	2,000,000	Average CO ₂ value for cars purchased under the program was 8% (in g/km) below that of non-incentivized purchases
	150,000	32 tons/day NO _x reduction; 3 tons/day PM reduction

Source: Posada et al 2015.

7. Vary the road user charge with truck age

i. Current challenge

Nearly 31 percent of the national truck fleet is above 8 years of age, while 95 percent of the fleet is more than 5 years old.⁷ Currently, the government offers no incentive to discourage the use of older vehicles. Interviews with truck operators and transportation companies have shown that driver-owners with limited access to capital typically use older trucks for a long period. In addition, to reduce their capital investments, operators of smaller trucks often purchase used trucks from larger operators. As discussed in Chapter 3, small-truck operators and owner-operators earn very low margins, from 3 to 5 percent. As a result, they have limited cash reserves and therefore opt for older, cheaper trucks. The following proposed policy could help dissuade truck operators from using an older fleet and opt for a more fuel-efficient fleet.

ii. Proposed policy

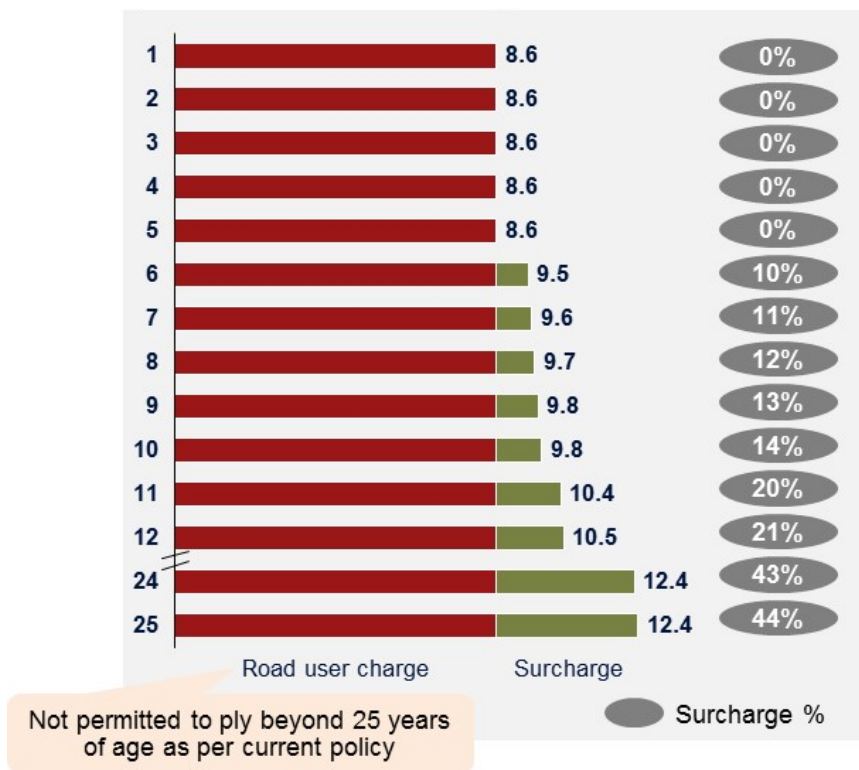
In order to lower the GHG emissions, truck operators must replace the older trucks in their fleets. This proposed policy specifies that older vehicles pay surcharge on the road user charges. The surcharge would be considered the additional “cost to the environment” caused by older trucks. Table 5.5 details the proposed policy:

Table 5.5. Road User Charge Variation by Age: Proposed Policy

Age of vehicle	Increment factor (illustrative)
<5 years	0% of road user charge increase year on year (YoY)
>5 years old	10% + 1% increase YoY
>10 years old	20% + 1% increase YoY
>15 years old	30% + 1% increase YoY
>20 years old	40% + 1% increase YoY

Figure 5.11 illustrates the proposed policy, using the example of an annual road user charges for a 20T truck.

Figure 5.11. Road User Charge Variation by Age: Illustrative



The current Circular 293/2016/TT-BTC, issued by the Ministry of Finance and implemented by the VR, regulates the road user charges for operators. If adopted, this policy could be integrated to the circular, linking the road user fees with the vehicle age. To incentivize newer vehicles, the scheme can design charges to be cost neutral or lower than currently charged rates, while still providing disincentives for driving older vehicles.

iii. International examples

Various countries across the globe have addressed the environmental issues from older vehicle fleets by implementing a systematic road tax structure. This study discusses two cases of Singapore and Germany, where the road tax structure depends on truck age and emissions standards.

- Singapore:** In Singapore, the statutory lifespan of a goods vehicle is 20 years—that is, a truck older than 20 years must be deregistered or scrapped. To penalize owners for driving vehicles more than 10 years old, the Government of Singapore applies a surcharge onto the annual road tax, at a pre-determined rate. The tax has shaped the nation’s truck fleet so that approximately 35 percent of trucks are less than five years old age; only 6 percent of the fleet is comprised of trucks older than 17 years. The road tax structure in Singapore is explained in table 5.6, below:

Table 5.6. Road Tax Surcharge Structure in Singapore*For vehicles over 10 years*

Age of vehicle	Annual road tax surcharge
>10 years old	10% of Road Tax
>11 years old	20% of Road Tax
>12 years old	30% of Road Tax
>13 years old	40% of Road Tax
>14 years old	50% of Road Tax

Source: Singapore Land Transport Authority: <https://www.lta.gov.sg/content/ltaweb/en/roads-and-motoring/owning-a-vehicle/costs-of-owning-a-vehicle/tax-structure-for-cars.html>.

- Germany:** In Germany, vehicles pay an annual road tax based on the pollutant class to which the truck belongs, with each pollution class corresponding to a Euro Emission Standard. Euro Emission Standards are updated regularly, which discourages people from owning and operating older vehicles. Depending on the size of the vehicle, operators owning vehicles with EURO 1 or below pay one to three times higher than vehicles in other pollutant classes. Table 5.7 lists the vehicle tax variation (in Euros per ton) by pollutant class.

Table 5.7. Vehicle Tax Variation by Pollutant Class in Germany*In Euros per ton*

Gross vehicle weight (GVW)	Pollutant class S2 ~ EURO 2 and higher	Pollutant class S1 ~ EURO 1
16T	51	96
25T	59	127
35T	62	142
44T	64	150
49T	65	153

Source: German Central Customs Authority.

8. Strengthen driver training and licensing processes

i. Current challenge

Truck drivers, through their driving behavior and adherence to traffic laws, contribute to the efficiency of trucking operations. Periodic driver training ensures continuous coaching of the driver about advancements in technology and enhances road safety, a primary concern among carriers in the road freight transport value chain. The nationwide trucking survey conducted as part of this study,⁸ as discussed in Chapter 2, highlights positive views held by carriers on regulations related to safety. The top four policies having the most positive impact, as reported in the survey, relate to truck driver licensing, maximum hours of continuous service for drivers, overloading limitations, and speed limitations.

Currently, the renewal of licenses does not require additional training. Licenses to operate smaller trucks (up to 3.5T)—the majority of the truck fleet—are valid for a period of 10 years. Within this time period, drivers should be trained regularly to keep up with technological advancements, such as eco-driving, engine modernization, infrastructural upgradation, etc.

However, companies report a lack of experienced and well-trained drivers. According to a survey conducted in 2016 by Asia Injury Prevention,⁹ 79 percent of drivers reported driving non-stop for more than four hours, which violates existing regulations.¹⁰ Key findings of this survey are listed below:

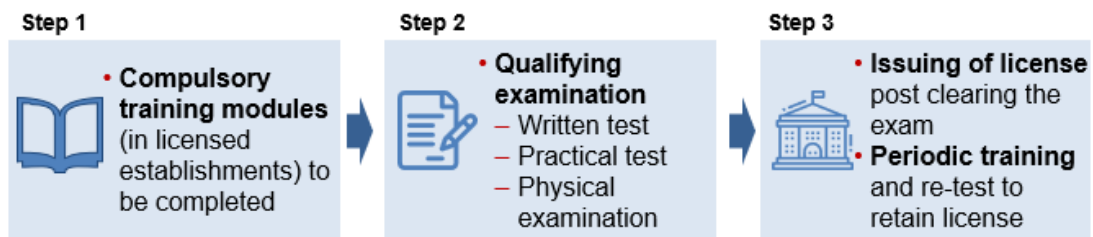
- 91 percent of the drivers did not clearly understand the regulation about keeping a safe distance from another vehicle while driving
- 86 percent of them provided inexact answers about how or when to make way for other vehicles
- More than 80 percent of the respondents did not closely observe the road while driving
- 69 percent of the drivers did not consider running stop signs unsafe

The results listed above indicate a need for enhanced driver training, as well as periodic road safety training. More than 30 percent of the road accidents occur on highways (Pham 2013), highlighting safety issues for truck drivers running long hauls. With approximately 3 percent of the Vietnam GDP lost due to road accidents (WHO 2015), driver training and safety on roads is crucial to the trucking sector and Vietnam's overall development.

ii. Proposed policy

In line with Vietnam's National Road Safety Goals 2020 and a Vision to 2030, this proposed policy aims to promote safety on roads through an extensive truck driver-training process. The policy outlines the process of obtaining a commercial driver license as well as driver training, with special focus on the periodic training sessions. The policy can be considered as an amendment to the current Circular No. 46/2012/TT-BGTVT, which regulates driver training, examination, and granting of licenses for motorized vehicles. Figure 5.12 outlines the procedure for obtaining and retaining the license under this proposed policy:

Figure 5.12. Driver Training and Licensing: Proposed Policy



While the circular already covers the training and written test, the proposed policy suggests the addition of a physical examination (including physical fitness, vision, and drug tests), to be conducted as a part of the qualifying examination. Further, the proposed policy suggests a four-module training program that could be incorporated into training sessions. The proposed curriculum has been benchmarked across different countries. The current training program (class B and C licenses) focuses on driving techniques, traffic rules, truck repairs, vehicle knowledge, and transport techniques.¹¹ However, the program contains gaps on softer aspects such as customer relationship management, and more importantly, the value of good personal health. Thus, the proposed training modules (figure 5.13) comprehensively cover all practical, theoretical, and management aspects related to truck driving.

Figure 5.13. Driver Training and Licensing: Proposed Training Curriculum

Module 1	Module 2	Module 3	Module 4
<ul style="list-style-type: none"> • Mechanical configuration of truck including: <ol style="list-style-type: none"> 1. Engine 2. Suspension system 3. Fuel system 4. Braking system 5. Wheels and tyres, etc. • Basic damage repair of truck parts • Coupling and decoupling of tractor-trailers 	<ul style="list-style-type: none"> • On-road driving techniques including: <ol style="list-style-type: none"> 1. Maneuvering 2. Speed controls/ Emergency brakes 3. Road signs interpretation 4. Vehicle parking, etc. • Extreme conditions: <ol style="list-style-type: none"> 1. Night driving 2. Adverse weather 3. Difficult terrains <p><i>Includes practical tests as well</i></p>	<ul style="list-style-type: none"> • Loading/unloading techniques • Security of cargo • Cargo documentation • Pickup and delivery procedures • Precautions for hazardous materials • Handling an accident 	<ul style="list-style-type: none"> • Employer relationship and job applications • Customer relationship management • Trip planning, cost control techniques • Personal health: <ol style="list-style-type: none"> 1. Working hours limit 2. Driver fatigue 3. Effect of alcohol and other controlled substances
Vehicle controls	Driving	Cargo handling	Business ethics

In addition, the policy recommends creating an online registry listing drivers’ professional background information and driving/traffic records to help trucking companies recruit highly trained, safe, and experienced drivers. This database could be maintained by the VR, using its technological leverage in maintaining the truck fleet database.

iii. International examples

As shown in Chapter 2, the United States and Germany have over 50 percent of commercial truck sales in the more than 15T segment. These countries have addressed safety concerns about large sized trucks through an extensive program for truck driver training and a strict licensing procedure, discussed in this section. Even in developing countries such as India, governments increasingly recognize the importance of periodic driver training for truck, bus, and taxi drivers.

- **United States:** The U.S. regulates the trucking industry through the Federal Motor Carrier Safety Administration (FMCSA), an agency under the Department of Transportation. The primary mission of the FMCSA is to reduce crashes, injuries, and fatalities involving large trucks and buses. The commercial driver's license training (or CDL training) is an extensive standardized program across the country, required before a driver can obtain a license to operate any commercial motor vehicle. Drivers must also pass exams testing their ability to drive hazardous materials, tank vehicles, and trailers. Three types of truck driving schools offer CDL training: programs offered through community colleges, private truck driving schools, and schools operated by trucking companies. The CDL requires a physical fitness check every year. Newly hired truck drivers typically participate in workshops and seminars sponsored by their employers, which cover transportation regulations, safety procedures, and federal trucking ordinances. In addition, the American Trucking Association (ATA) holds online workshops for truck drivers in all areas of business, such as legal, financial, and operational areas of truck driving.
- **Germany:** The Federal Motor Transport Authority (Kraftfahrt-Bundesamt, or KBA) manages road safety-related issues in Germany, including maintaining the central register of driving licenses and vehicle worthiness. To obtain a trucking license, a driver must first have a license to operate a car. To obtain a trucking license for corporate purposes, drivers must complete an additional traineeship, or a special certification can be obtained consisting of additional exams and driving tests. As part of the new Professional Driver Qualification Law (Berufskraftfahrer-Qualifikations-Gesetz), the driver must attend mandatory training seminars every five years to continue working as a professionally employed driver.
- **India:** Applicants for a commercial vehicle license must undergo training either from the government-run motor driving school or private motor driving schools authorized by state governments. The applicant must also have a valid learner's license at the time of application. Some state governments have introduced "refresher courses" for drivers to hone their skills as needed. For example, Karnataka state government mandates these refresher courses, taught in

the state-run Driver Training and Research Institute, for drivers of autorickshaws, lorries, tractors, and maxi cabs (Jagadeesh 2012). Recently, Uttarakhand Transport Corporation, the state-run bus agency, has launched a six-month program (a collaboration between the state government and Maruti Suzuki), under which bus drivers must complete a three-day refresher training course at the local training institute (Talwar 2015).

9. Improve the fleet through a growth-based lending program

i. Current challenge

Larger-sized trucks have higher efficiencies in both costs and GHG emissions. Compared to a 5T truck, a 31T trailer has approximately 75 percent lower transportation costs per ton-km and GHG emission efficiency in terms of g of CO₂ per ton-km.¹² However, the highway traffic in Vietnam, as observed by the OD model in the study, shows the average truck size is less than 10T, which has a significant impact on costs and GHG emissions across the sector. In addition to the cost burden, smaller truck size leads to more trucks on roads, and the resulting increase in congestion and pollution. To complement this policy, truck driver training would have to incorporate safety training operators of larger vehicles.

Cost usually represents the biggest hindrance for a truck operator to buy new, larger-sized truck. Given that 75 percent of truck operators in Vietnam generate less than US\$1 million in revenues, the need for cheaper financing alternatives and incentives to encourage operators to purchase larger, newer trucks and scale-up fleets.

ii. Proposed policy

The proposed lending scheme aims to give smaller operators access to cheaper loans with which they can upgrade their fleet and grow their business. The State Bank of Vietnam (SBV) has listed the following businesses in priority sectors for financing: agriculture, small and medium-sized enterprises (SMEs), firms producing goods for export, and hi-tech technology enterprises. The current rates of lending to priority sectors have been lowered to 6 percent per annum.¹³ Including trucking and logistics companies on the list of priority sectors could help the transportation sector achieve significant improvements.

The proposed lending scheme also suggests key performance indicators (KPIs) for these affordable vehicle loans, which direct the bank's financing of trucks toward a larger-sized and younger truck fleet while successfully growing companies to promote more sector organization and lessen excessive fragmentation. According to this proposal, banks may provide truck loans, at the defined priority sector lending rates, for the purchase of new and trucks more than 10T. Loans would be based on the KPIs given below:

- Growth of fleet size and employee size in the past three years
- Growth of revenue in the past three years

For the scheme to succeed, SBV would need to explicitly recognize the truck operator business as a “priority sector.” For this priority sector, the SBV could also consider shifting from the current implementation method of an interest rate cap for priority sector lending to loan quotas, keeping a fixed percentage of assets allocated to priority sector loans. Similar shifts in financing done in other developing countries like India, Thailand, Philippines, and Indonesia, have ensured a fixed amount is disbursed for the development of businesses in the country’s priority sectors.

iii. International examples

Truck financing is typically done through balance sheet borrowing and asset financing, with most of the lending players using trucks as collateral. This section discusses several Asian countries that use state-directed priority sector lending as a policy tool to provide underserved sectors access to credit.

Priority sector lending (PSL) by the Reserve Bank of India (RBI) helps by incentivizing commercial banks to provide loans to finance small trucking companies. According to this scheme, domestic commercial banks (and foreign banks with more than 20 branches) must provide 40 percent of their adjusted net bank credit (ANBC) to priority sectors, such as agriculture and SMEs across industries, at RBI rates lower than standard bank rates.¹⁴ Transport operators with fewer than 10 vehicles fall into the SME category, and thus have access to 7.5 percent of ANBC. This scheme incentivizes banks to lend more through PSL, as these loans provide a better source of interest income than compulsory contributions to national funds earning no interest.

A comparative analysis of priority sector lending schemes in various Asian countries are tabulated below, in table 5.8.

Table 5.8. Priority Sector Lending Regimes in Asia

Country	Preferential lending	Priority sectors
	<i>Loan quotas</i>	
India	40%	Agriculture (18%), SMEs, export, microfinance
Indonesia	20%	SMEs
Philippines	8%	SMEs (6% small; 2% medium)
Thailand	20% of deposits	Agriculture (14%) and small-scale industries (6%)
	<i>Interest rate cap</i>	
Vietnam	200 basis points above deposit ceiling	Agriculture, SMEs, export, technology
Malaysia	200 basis points above base lending rate	SMEs

Source: Federal Reserve Bank of San Francisco, Country Analysis Unit (*Asia Focus*, September 2014): <https://www.frbsf.org/banking/files/Asia-Focus-Priority-Sector-Lending-in-Asia-September-2014.pdf>.

10. Establish cooperatives for truck owner-operators

i. Current challenge

As discussed in Chapter 2, two-thirds of the registered companies have employee strength of less than 50. Due to their extremely small scale and limited cash reserves, these companies are not able to invest in their fleet or operations. A reported 2 to 3 percent of registered trucking companies went out of business in 2017 due to continued losses. Cooperatives could serve as a tool for the sub-scale businesses to pool their resources and achieve higher profits as a group.

Currently, Decree 86/2014/ND-CP regulates the business conditions and granting of permits for the automobile transportation business, a major step taken by the GoV to tackle fragmentation. According to the Decree, enterprises and cooperatives involved in goods transport via containers and business units using trailers, semi-trailer tractors, or autos to transport goods on itineraries totaling 300 km or more, must have a minimum number of autos: 10 for units with head offices in central cities, and 3 to 5 autos for units in other localities. Ambiguity in the policy statement and difficulty in tracking distances travelled by trucks, which vary based on the route travelled, makes this law difficult to enforce. As a result, the policy has achieved limited success in curbing fragmentation. Similarly, Decree 144/2018/ND-CP regulates multimodal business by providing a clause for maintaining a minimum asset base equivalent to SDR 80,000.¹⁵

Decree 86 could be strengthened by explicitly requiring any trucking business operating long-distance routes to own a minimum number of trucks. The requirement would be assessed through an intercity license and defined procedures for license renewal. With these changes, Decree 86 could be more easily implemented to help tackle excessive trucking fragmentation in Vietnam, as intended by the government.

Furthermore, a transport cooperative could potentially address the challenges of excessive fragmentation in the trucking sector and therefore improve sector efficiencies. Most cooperatives in Vietnam (approximately 55 percent) operate in the agricultural and fishing sectors. Transport cooperatives, in comparison, account for a very small proportion (approximately 5 percent) of the total cooperatives in existence today (Nguyen and Ngo 2015).

ii. Proposed policy

The policy proposes to develop the transportation cooperative market, where the cooperative society pools the interests of smaller trucking business and encourages them to operate more efficiently. The Vietnam Cooperative Alliance (VCA), in association with the Vietnam Logistics Business Association (VLA), could promote the setting up of such a cooperative through:

- Providing easy credit for the initial setup
- Providing tax rebates for the initial years
- Supporting technology transfer
- Training

The policy would focus on establishing cooperatives in provinces in the Northeast, Northwest, South Central and Red River Delta regions, where the fragmentation is extremely high, with the average

truck fleet size lower than the national average of fewer than five trucks per company. The cooperatives are expected to consolidate the smaller players by providing them scale and scope economies. In addition, by representing smaller, individual players collectively, cooperatives can negotiate better prices and truck use. In summary, transport cooperatives could help the industry in the following areas:

- Match demand and supply better
- Allow for higher truck utilization
- Pool assets
- Avoid information asymmetries
- Contact larger shippers as a larger entity group
- Pool resources for training, maintenance, etc.

For implementation of this policy, Decree 163/2017/ND-CP, defining the guidelines to set up a business in Vietnam, could include cooperatives as a separate business entity with operating guidelines.

iii. International examples

This section talks about other Asian countries with thriving transport cooperatives, supported by the government.

- **Philippines:** Established in 1983, the Office of Transport Cooperatives (OTC) is a government agency in the Philippines responsible for the implementation of rules and regulations that governs the promotion, organization, regulation, supervision, registration through accreditation, and development of transportation cooperatives, which are subject to the approval of the Department of Transportation. In order to be recognized as an official cooperative, cooperative pay the initial registration fee—either 1 percent of the authorized capital or a flat fee (range US\$10-60).¹⁶ The OTC monitors the cooperative operations and recommends the issuance of certificates of compliance. The OTC offers the following key programs and services:
 - i. Capacity-building programs: These programs include seminars for transport service cooperatives (TSCs) designed to provide basic orientation and appreciation on how TSCs should operate as business enterprises and service providers. They also highlight the significance of the members' participation and involvement as key to realizing the cooperative's socio-economic objectives.
 - ii. Assess and assist program: With the primary goal of instituting appropriate technical guidance, assistance, and coaching, this program assesses the transport service cooperatives' administrative and operational records, conducts interviews to gather diagnostic inputs, and performs various other observations and verification activities.

- iii. Technical development assistance services: The OTC provides assistance by validating and then recommending TSC applications and proposals to franchise-related governing partner agencies, along with facilitating other transport operations, such as applications for certificates of public convenience (CPC), CPC extension of validity, franchise consolidation, route opening and modification, change of motor or chassis, etc.
- **Malaysia:** Incorporated in 2008, the cooperative commission of Malaysia (SKM) is tasked with encouraging the stability of the cooperatives sector. The SKM offers five major services: registering cooperatives, financing capital funds, providing assistance grants, offering service accounts, and providing auditing and legal advisory services.¹⁷

Demand-Side Policy and Investment Options

Demand-side policy options focus on improving the demand-supply match in the industry through promotion of brokerage firms and innovative digital aggregator models in the logistics space, leading to improved truck utilization and sector organization.

11. Promote brokerage firms for better demand-supply matching

i. Current challenge

Vietnam faces a key issue of market fragmentation, which hinders freight consolidation. On average, each company operates five trucks, and hence, a shipper moving high volumes of freight needs to contact multiple transport companies to handle the cargo. The lack of information flows results in inefficient matching of supply-demand, which then leads to more empty backhauls, higher overall transportation costs, and compounds the sector fragmentation. According to the national survey conducted within the study, Vietnam experiences empty backhauls rates as high as 50 to 70 percent.

A brokerage firm acts as a middle platform between the shippers (demand) and the trucking companies (supply). Using personal connections and networks to match supply and demand, most brokers in Vietnam currently operate provincially or regionally only, and not pan-Vietnam, which leads to information and transport inefficiencies.

ii. Proposed policy

This proposed policy aims to organize and promote the brokerage sector, encouraging pan-Vietnam companies to operate as registered broker firms. By leveraging systematic databases, these pan-Vietnam companies could match supply-demand more efficiently than those operating locally through personal networks. The policy involves new regulations for registering brokers, promoting the use of broker firms, and providing incentives for successful international brokerage firms to establish branches in Vietnam.

Suggested regulations for the registration of a brokerage firm:

- The individual or firm must apply for the permit with Ministry of Transport, as per Decree 86/2014/ND-CP, to register as a brokerage entity
- The traditional business permit issued by the authority should be supported by a broker license, renewable upon payment of an annual fee
- As security, the broker must deposit a minimum sum of money in a surety bond or trust fund, in the event either party (e.g., shippers or truckers) defaults
- The broker must occupy a registered office space

The suggested conditions of requiring a security deposit and registered office space should help filter the sub-scale companies and single-person broker services currently widespread in Vietnam that do not have the economies of scale.

Suggested incentives to encourage pan-Vietnam brokerage service:

- Provide corporate tax incentives to brokerage firms
- Allow 100 percent FDI in the freight brokerage space to encourage investment by wholly-owned subsidiaries or branches of internationally successful players in freight brokerage space
- Encourage cooperatives of smaller brokers to achieve efficiencies from scale

iii. International examples

- **United States:** The U.S. has one of the strongest road freight brokerage networks in the world; based on 2018 revenue in US\$, the top five brokerage firms are headquartered in United States. Broker registration falls under the jurisdiction of the Federal Motor Carrier Safety Administration (FMCSA). The brokerage registration process involves obtaining an operating authority from FMCSA, designating a process agent, arranging for a trust fund, paying an annual fee, and setting up of office. To raise the standard for freight brokers, in 2013, the government increased the required freight broker bond amount from US\$10,000 to US\$75,000. Though the increase forced smaller brokers out of business, the remaining brokers emerged with a strong reputation throughout the industry of having good credit and reliability. This, in turn, raised overall trust in freight brokers, with the number of brokers steadily increasing since 2013. In fact, the overall high level of trust in the industry is a major reason for the country's successful brokerage market.
- **Thailand:** Thailand's logistics industry includes a number of established foreign companies, with its major players—including DHL, DB Schenker, Yusen Logistics, and Kerry Logistics—offering a wide range of freight forwarding, brokering, and supply chain services. In Thailand, several

logistics multinationals often outsource transportation and logistics activities to local 3PLs, with logistics parties or agents handling the various customs and declaration procedures in multiple markets within ASEAN (Yuen 2015). Many foreign companies entering the Thai logistics market opt to form joint ventures with local partners who have well-established business networks and market knowledge. Alternatively, for marketing and networking purposes, a foreign company may choose to open a representative office in Thailand. The Thai government also offers various tax and non-tax incentives to foreign companies looking to invest in logistics activities and facilities (BoI 2015). The Board of Investment offers the following tax incentives, upon approval:

- An eight-year exemption from corporate income tax
- A 50 percent tax reduction for five years after the eight-year tax holiday
- Double deductions for transport, electricity, and water supply costs
- A 25 percent deduction on facility installation or construction as well as exemption from import duty on raw or essential materials imported for use in export production

12. Increase investments in digital freight aggregator models

i. Current challenge

As explained in the previous policy, efficient supply-demand matching is essential to curb the problem of high empty backhauls in Vietnam. Along with the increase in brokerage companies, an emerging global trend is the increasing use of technology platforms to match cargo demand and supply. Such logistics technology platforms use algorithmic, real-time matching for instant online transactions—with value-added features, such as dynamic lane rates, end-to-end tracking, and dynamic pricing options based on goods type (apart from size and weight). Increased investments and promotion of such innovative logistics solutions could potentially disrupt the industry.

With Vietnam experiencing a rapid growth in startups, funding remains sub-scale; 61 percent of projects receive investments of less than US\$1 million (Das 2018). Approximately 80 to 90 percent of start-ups fail in the early stages because they don't have sufficient funding to expand (Nguyen 2018). Therefore, a more nurturing ecosystem that offers more funding and resources for logistics start-ups and technology platforms could encourage the growth of digital aggregators. In the *U.S. News and World Report* 2018 rankings of "Best Countries for Starting a Business," Vietnam ranked 52nd behind other Asian countries, including Japan (2nd), Singapore (8th), South Korea (12th), Malaysia (34th), and Thailand (38th).

The disruptive models that have improved trucking sector efficiencies in various countries are listed below:

- **Transfix (USA); asset-light model:** Started in 2013, the Transfix mobile app and web platform caters to interstate freight shipping. The platform has reduced the time taken to match a shipment and truck driver to 15 minutes, compared to approximately four hours required to match manually. The app has helped reduce transaction times by 50 percent and empty miles by

85 percent (Jaffe 2015). Transfix also features an online marketplace platform that allows carriers select loads based on their preferred price point, rather than an app-decided match.

- **Rivigo (India); asset-heavy model:** The Rivigo platform facilitates better truck utilization and improves working conditions for drivers. As the owner of the truck assets, Rivigo uses a relay system that allows drivers to end shifts and hand off trucks without interrupting its 24-hour route operations, a system that provides a better quality of life for the drivers. Rivigo's technology-enabled fleet has led to a 50 to 70 percent reduction in transit times.
- **Yun Man Man (China); asset-light model:** Founded in 2013, Yun Man Man operates a mobile platform that helps truck drivers to more effectively and efficiently locate, secure, finance, and manage their cargo inventory. In less than five years, the platform has registered more than 4 million heavy-duty truck drivers (approximately 78 percent of China's total trucks) and more than 1 million cargo owners. By improving driving mileage and shortening trip times, the Yun Man Man platform has saved truck drivers nearly CNY 130 billion on diesel costs and 70 million tons of greenhouse gas (GHG) emissions.

Vietnam can increase sector efficiency by providing an ecosystem where these types of logistics technology platforms can thrive.

ii. Proposed Policy

This proposed policy aims to solve the issue of supply-demand matching through increased private and public sector investments in the digital freight aggregator models. The policy includes the following features:

- Allow brokers and aggregators to use government CVTS data for efficient analysis of demand flows
- Allocate a fixed percent of National Agency for Technology, Entrepreneurship, and Commercial Development (NATECD) funding for start-ups in the logistics space, and streamline the disbursement process
- Promote FDI investments by explicitly including logistics technology start-ups and freight brokerage businesses in the FDI policy
- Organize industry seminars and startup fairs to attract financing from senior industry players and funds
- Establish a dedicated, government-funded board to support research and development in the urban solutions space
- Provide mentorship and training to logistics technology start-ups

To promote disruptive innovations and direct funds into the logistics technology space, this subsector could be included in the medium- and long-term investment plans of the Ministry of Planning and Investment.

iii. International examples

- **Singapore:** “Start-up SG” provides Singapore-based start-ups with access to funding sources and mentorship programs, thereby helping transform innovative business ideas into thriving companies. Qualifying start-ups can access cash grants, equity financing, and business loans. Under the “equity” scheme, the government co-invests, with private investment partners, in start-ups that require significant capital expenditure. The “tech” grant provides project funding for local Singapore companies developing breakthrough technology that could either disrupt current markets or create new markets. In addition, A*STAR (Agency for Science, Technology and Research), a statutory board under the Ministry of Trade and Industry in Singapore, supports research and development aligned to the national needs of Singapore.
- **India:** The “Start-up India Hub,” a virtual online platform connecting various stakeholders such as start-ups, investors, etc., was launched by the Government of India in 2016. The learning and development module of the Start-up India program offers free entrepreneurship courses. In 2017, the FDI policy mentioned start-ups for the first time, allowing start-ups to issue equity, equity linked instruments, or debt instruments to foreign venture capital investors against receipt of foreign remittance. Start-ups can also issue convertible notes to individuals residing outside India.

Process-Related Policy and Investment Options

The process-related policy options address key issues in the overall process performed by a transportation company, from cargo pickup to cargo drop-off, including the truck driver’s entire road journey.

13. Launch an issue resolution mobile app

i. Current challenge

During their transportation runs, truck drivers experience problems first hand, problems such as road congestion, accidents, unauthorized vehicle stoppages, etc., with no platform available for truck drivers to flag issues faced while on the road.

A government-run app developed for truck drivers to report issues could be extremely useful, providing authorities with a real-time status of transportation-related problems. It could potentially lead to better governance, and policy makers could use app-collected data to prioritize long-term

plans. The app data could also identify choke points in road infrastructure. In addition, information on accidents and informal fees could improve accident recovery and enhance governance.

ii. Proposed policy

The proposed issue-resolution mobile app allows trucks drivers to report transportation journey-related issues. Further, geo-tagging of the issue could help local authorities monitor and address problems. Common issues that drivers could report via the app include the following:

- Congestion
- Informal fee payments
- Accidents and other driving-related issues

Figure 5.14 illustrates the app interface.

Figure 5.14. Sample App Interface for Trucking Issue Resolution

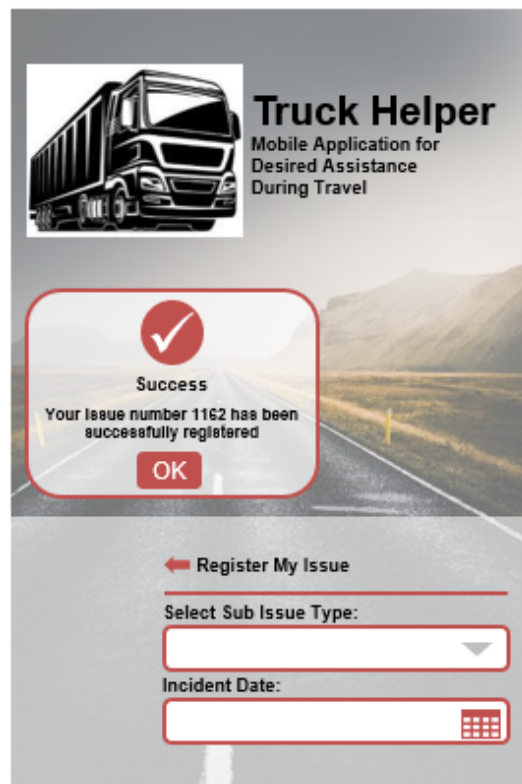
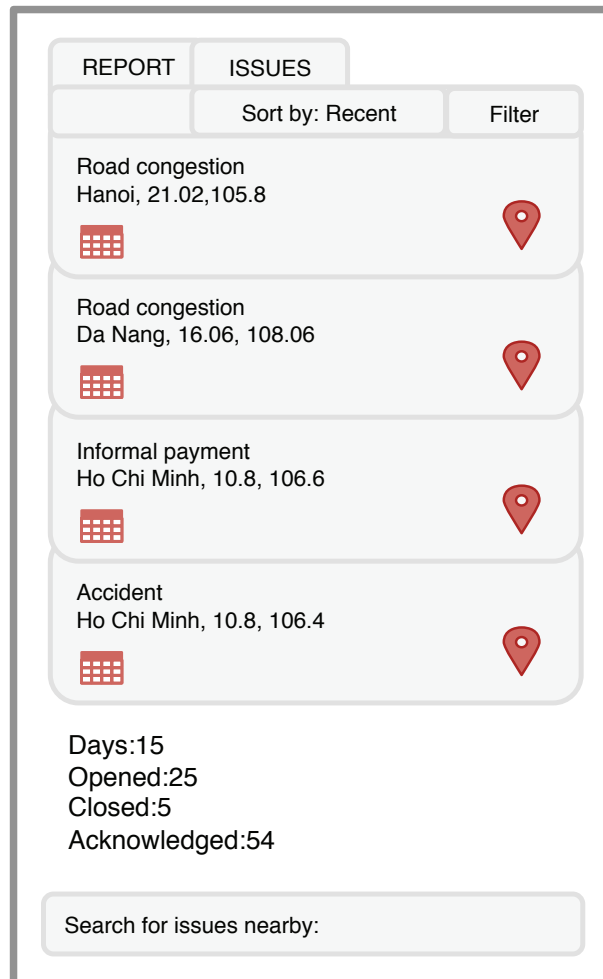


Figure 5.15 illustrates a sample app dashboard, which would be available to the concerned authorities.

The app could also feature a redressal mechanism whereby a dedicated committee or working group composed of various authorities would develop, in a timely manner, solutions to the most commonly reported problems. For example, the DRVN and VR work under the jurisdiction of the MOT, while the traffic police fall under the jurisdiction of the Ministry of Public Security and public works is overseen

the jurisdiction of the Ministry of Construction. A committee or dedicated team composed of key stakeholders from the various ministries would provide a holistic perspective on the road sector and offer integrated solutions to road-related issues.

Figure 5.15. Issue Resolution Mobile App Dashboard: Illustrative



iii. International examples

Various countries have been using mobile applications as a platform to raise the public's concerns to the appropriate authorities. Some of the well-received, government-supported mobile apps include the following:

- **Colab App (Brazil):** An app developed in the private sector, the general public can use Colab App to report issues, suggest improvements, and rate public services. Over the past five years, the app has partnered with city halls of more than 130 cities in Brazil. Municipalities use the app's free dashboard to monitor and respond to citizen complaints. In one city, the Colab App platform

helped raised participation in a simple municipal budget hearing from 300 to more than 10,000 individuals.

- **SeeClickFix (USA):** An app used to address federal issues by delivering service requests to governments, SeeClickFix has become the official non-emergency reporting platform for approximately 300 cities, with data integrated with the 311 (non-emergency call number) system and a current resolution rate of 90 percent. SeeClickFix encourages residents to actively report neighborhood issues, which are then directed to the respective governments.
- **Noise App (Ireland):** Launched in partnership with the Police Service of Northern Ireland and the Northern Ireland Housing Executive, Noise App allows community residents to complain about nuisances relating to high noise levels in their neighborhoods. Using the app, residents can log location, dates, times, make 30-second recordings of the high noise level and explain how the noise is affecting them. The data is then automatically sent to the investigating environmental health officer. Council officers follow up in person, and can use the recordings as supporting evidence.

14. Roll out e-tolling and CCTV cameras at tollbooths

i. Current challenge

Because long wait times at tollbooths, especially at city entry points, often nullify any time saved by using highways or expressways, many drivers avoid toll roads. Along with the time delays, the extended idling time waiting at congested toll plazas results in additional fuel burn. Every year, paper ticket printing and traffic congestion at manual toll collection (MTC) systems costs Vietnam approximately US\$162.7 million (Vietnam News 2018). However, RFID (Radio-Frequency Identification) tags can reduce the time spent at the tolls. The RFID toll system detects the vehicle and electronically deducts the toll amount from the account linked to the vehicle's tag, eliminating the need for the vehicle to stop at a tollbooth. In addition to saving the truck operators' time, the RFID system also benefits the government by reducing labor costs at toll plazas, while dynamic toll and tax pricing increases toll collection.

Installing CCTVs at tollbooths would also aid in monitoring congestion and reducing informal payments, which currently account for nearly 10 percent of operator costs.

ii. Proposed policy

In 2015, DRVN and VietinBank started developing the electronic toll collection (ETC) system in Vietnam launched in 2016. With RFID tags now available on nearly 500,000 of the 3 million cars in Vietnam, the government plans to roll out ETC nationwide. Thus far, e-tolling has been implemented on 25 tollbooths (Ngoc 2018)—approximately 33 percent coverage.

This policy proposes prioritizing three highway routes (QL1A, QL5 and QL 20) on which e-tolling implementation could be accelerated. Together, the three proposed highways account for approximately 30 percent of the national truck-carried freight flows and around 60 percent of the country's tollbooths.

The policy also recommends installing CCTVs at all tollbooths to monitor traffic congestion and flag any unauthorized practices related to informal fees. The surveillance footage can be monitored by DRVN or other relevant authorities to observe real-time traffic flow around tollbooths.

iii. International examples

ETC is a common phenomenon across multiple countries. Examples from the United States and Sweden¹⁸ are highlighted below:

- **United States-Mexico Border:** Every day, the RFID-enabled lanes at the US-Mexico border handle 20,000 vehicle crossings. The ETC program aims to reduce congestion, improve toll efficiency, and add potential revenues streams through use of electronically stored traffic data. RFID-enabled cars pass through dedicated lanes equipped with readers, which measure the amount of time a car takes to pass the border. Readers also capture the timestamp and location of each vehicle. The program has reduced vehicle inspection time from 35 to 10 seconds, saving labor costs.
- **Stockholm, Sweden:** The dynamic road tax program in Stockholm involves the use of RFID tags. The RFID system senses every car (equipped with an RFID tag) crossing into the city's central district. The e-tolling system, which processes 2.5 million transactions per day, identifies the vehicle and calculates the road usage fee based on the time of day. E-tolling has led to a 20 to 25 percent reduction in overall traffic volume in central Stockholm (Arnold et al 2010). The program recovered its initial investment costs of approximately EUR 380 million in three years, and is currently a self-sustainable program with annual revenues of EUR 96 million.

Policy Impact Assessment

The policy interventions elaborated in the above section are expected to improve the efficiency of the trucking sector in Vietnam. For example, the proposed policy interventions will produce a positive impact on truck fleet characteristics, such as truck age, truck size, and truck fleet utilization. This section discusses the major impacts of the policy interventions.

These policy interventions are expected to drive six key changes in the sector, which in turn will have a positive impact on the key output metrics—for example, freight cost and emissions:

- 1. Reduction in road freight share:** The infrastructural policies for improving road access to ports, promoting containers on barges, and coastal shipping aim to shift loads from roads to other modes, such as inland waterways and coastal ships. The improved containerization and upgraded port infrastructure should help promote multimodality between various modes of transport.
- 2. Improved truck utilization rates:** Policies aimed at efficient supply-demand match—for example, establishing cooperatives, creating a legal framework to promote brokerages, and increasing investments in digital freight aggregator models will tackle the problem of empty backhauls and LTLs. In addition, the infrastructural policy on developing logistics and urban consolidation centers aims to consolidate freight and increase utilization of truck capacity.
- 3. Reduction in vehicle age:** The following three policy interventions are expected to lower the average fleet age in the country, and therefore lead to increased fuel efficiency:
 - Fleet modernization program
 - Road user charge based on vehicle age
 - Fleet improvement through a growth-based lending program
- 4. Increase in the average carrying capacity of the fleet:** The proposed policy of a growth-based lending program for larger and newer trucks will likely increase the number of trucks with higher carrying capacity. The fleet modernization program could also incentivize operators to purchase larger-sized trucks, reducing the number of trucks required to carry the same amount of freight.
- 5. Lower transit time:** Infrastructural policies on road upgradation and the accelerated roll out of e-tolling will likely, lower traffic congestion on roads and reduce waiting times, thereby leading to shorter transit times.
- 6. Better driving ethics and governance:** Process related policies, including the development of issue-resolution mobile app and committees as well as improved driver training should result in better driving ethics (e.g., fewer accidents) and enhanced governance to the trucking sector (e.g., fewer informal payments). These policies will also streamline the overall process of transporting freight by road.

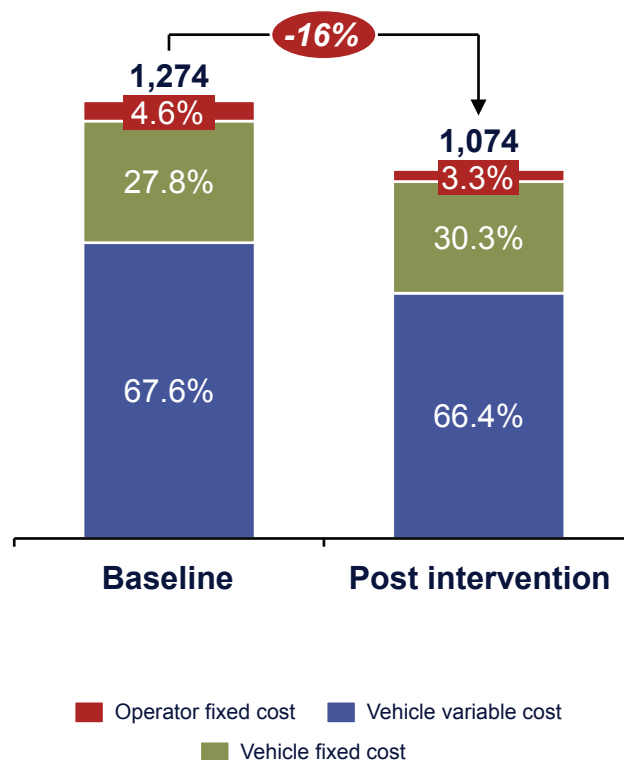
Reduction in transportation costs

Improving truck fleet characteristics—for example, fleet age and carrying capacity—will have a positive impact on both fixed transportation and variable transportation costs. Better fuel economy, on a per-ton basis of newer and larger vehicles, and lower costs to maintain a younger fleet will help lower variable costs. With more larger-sized trucks in the fleet to transport the same amount of freight and reduce empty backhauls, fewer trucks would be required. Reduced trip time would also increase the number of trips and allow for more freight haulage in fewer trucks. In addition, improved vehicle utilization would result in better amortization of fixed costs over a larger revenue base, while better governance mechanisms and better rule compliance will lead to reduced payments of informal fees. With these benefits in mind, the proposed policy interventions should reduce transportation costs per ton-km for intercity routes by 16 percent (figure 5.16).

Since transportation costs accounts for nearly 60 percent of the total logistics costs (MoIT 2017), with intercity truck freight representing 20 percent¹⁹ of the total annual freight tonnage, reduction in intercity transportation costs by 10 to 15 percent could lead to a sizeable reduction in the total logistics costs in Vietnam.

Figure 5.16. Post-Intervention Reduction in Transportation Costs

In VND per ton-km



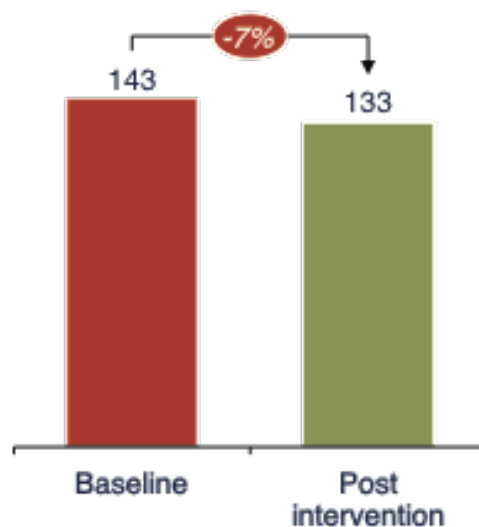
Note: Operator fixed costs include administrative and office costs. Transportation costs calculated based on the methodology discussed in Chapter 3; key assumptions for impact assessment include 50 percent increase in payload of intercity trucks, 5 percent reduction in informal fee, 5 percent reduction in transit time, and 10 percent reduction in empty backhauls; calculations done for a long-haul trip (1,500 km)

Reduction in GHG emissions

GHG emissions depend directly on the amount of fuel consumption. Younger fleets with improved fuel efficiency will have lower emissions. Also, with improved backhaul utilization and reduced delays, fewer trucks would be required to transport the same freight, further reducing fuel consumption. Overall, the policy interventions should result in about 7 percent reduction in vehicular GHG emissions (figure 5.17).

Figure 5.17. Reduction in GHG Emissions Efficiency

In grams of CO₂ per ton-km

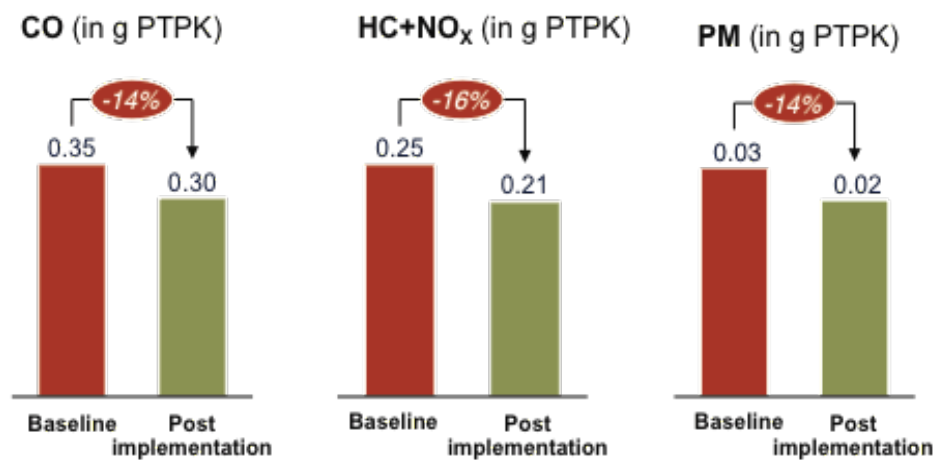


Note: GHG and pollutants emissions calculated based on the methodology discussed in Chapter 4; key assumptions for impact assessment include 20 percent increase in Euro 4 compliant vehicles, reduction in vehicle age (truck age less than or equal to five <=5 years for long-haul trucks), truck speed increase by 5 percent and empty backhaul reduction by 10 percent.

Reduction in pollutants

Vehicle-generated pollutants are regulated by the relevant emissions norms. For example, compared to recent Euro 4 vehicles driven by the engine efficiencies, older vehicles—subject to Euro 2 standards—contribute more pollutant emissions. The proposed policies, by incentivizing the purchase of new trucks and disincentivizing the use of older trucks, work to lower the average age of truck fleets. Accordingly, having more and newer trucks complying with the recently introduced Euro 4 norms will result in fewer emissions of environmental pollutants. Depending on the pollutant type, pollutant levels should therefore drop an estimated 14 to 16 percent (figure 5.18).

Figure 5.18. Post-Intervention Reduction in Pollutants

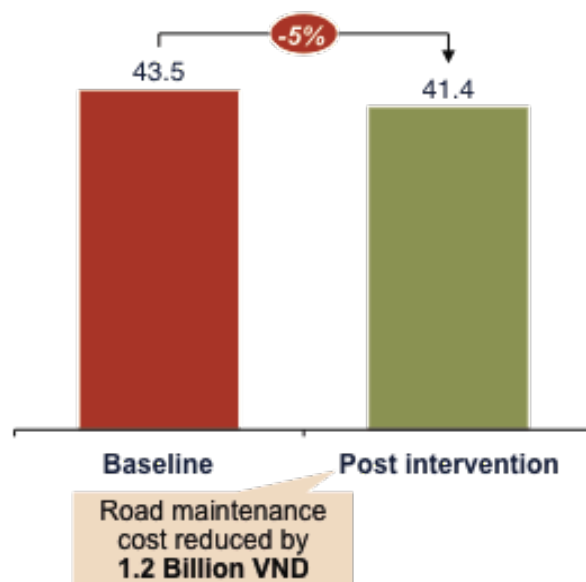


Note: CO = Carbon monoxide, in grams PTPK (per ton per km); HC+NO_x = Hydrocarbons + Nitrous oxides in grams PTPK; PM = particulate matter, in grams PTPK.

Reduction in road damage

Shifting freight from road to other modes of transport entails reducing the load applied to roads. Road damage factor, a numerical estimation of road damage, is based on the equivalent standard axle load (ESAL) applied. Road damage can be described as a condition in which the road structures fail to optimally serve the traffic above. According to the study’s origin-destination (OD) model, the shift to transporting goods on inland waterway transport (IWT) networks and coastal shipping could reduce the road damage factor—for roads considered in the OD Model—by about 5 percent (figure 5.19).

Figure 5.19. Post-Intervention Reduction in Road Damage



Source: Sholichin and Rumintang 2017 and Nguyen and Le 2016.

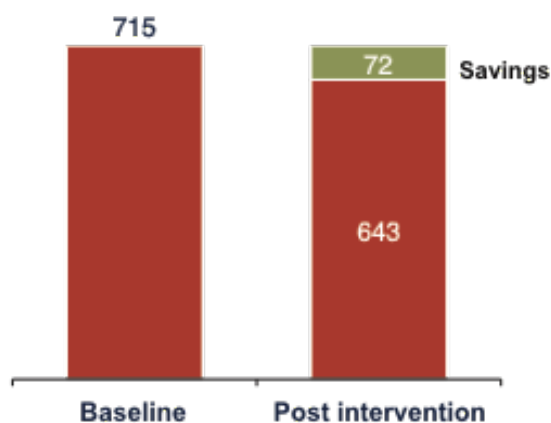
Note: Value of road damage calculated based on Sholichin and Rumintang 2017. Values of damage factor in million units; key assumption of 5 percent reduction in road freight share, which contributes to lower road damage. Cost of maintenance taken to be approximately US\$3,300 per km, calculated based on Nguyen and Le 2016.

Reduction in road accidents

Enhanced driver training, along with the issue-resolution app, should help improve driver behavior and overall road safety levels. Since the GoV bears the loss of or damage to any public property caused by an accident, better road safety will reduce government-borne costs; according to a report prepared by the International Road Assessment Programme (iRAP), a 10 percent reduction in the number of accidents would save the GoV approximately VND 70 million (figure 5.20).

Figure 5.20. Post-Intervention Reduction in Road Accidents, in Cost per Year

Annual cost of road accidents, in million VND



Note: Assuming a 10 percent reduction in deaths, number of deaths and cost of accidents calculated based on International Road Assessment Programme (iRAP) Vietnam Report.

Reduction in the GoV's forex expenditure

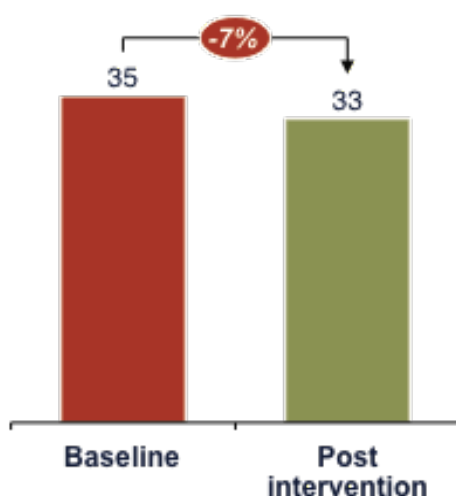
Forex expenditure is affected by the amount of fuel a country imports. With a current annual diesel oil shortage of 1.8 million tons (VietnamNet 2017), Vietnam must import crude oil to meet its fuel supply needs. Looking ahead, policies targeted toward a younger—and more fuel-efficient—fleet with larger, higher capacity trucks should help reduce the number of trucks on the road. As a result, fuel consumption, along with the need to import fuel, will decrease. Driven by these policy interventions, Vietnam's overall forex expenditure on crude purchase could reduce by approximately 7 percent (figure 5.21).

To assist policy makers in better understanding the relative costs and benefits of the various policies, the study proposes a policy prioritization matrix, illustrated in table 5.9.

Collectively, the policies are projected to significantly improve Vietnam's trucking sector as well as lower logistics costs and GHG emissions. Given the trucking sector's dominance in the logistics sector, this will, in turn, improve Vietnam's trade competitiveness and produce positive social and economic benefits for Vietnam's citizens.

Figure 5.21. Post-Intervention Reduction in Forex Expenditure

Forex expenditure in billion VND



Note: Assuming the reduction in fuel consumption will be entirely compensated from imported fuel, current fuel consumption would be reduced by 5 percent, due to the reduced number of trucks, and by 2 percent, due to the improved age of trucks, which translates into lower fuel import costs for the government.

Table 5.9. Impact and Cost Assessment of Policies

No.	Policies	Impact on Transportation Costs	Impact on GHG emissions	Investment (VND) ¹	
				High ●	Low ○
1	Reduce congestion around major ports	High	Medium	●	• Road widening, parking bays, cargo consolidation yards, dedicated truck corridors, and lane upgrades
2	Promote "Container on Barges" to boost IWT usage	Medium	Medium	●	• Fleet modernization, port facilities' upgrade
3	Promote coastal shipping on North-South Vietnam route	Medium	Low	●	• ICDs near ports, port handling capacity, and facilities
4	Integrate urban consolidation & logistics centers in ICD Plan	High	Low	●	• Setting up of urban consolidation and integrated logistics centers
5	Prioritize and upgrade key road infrastructure	Medium	Low	●	• Elevated roads, road widening, dedicated truck corridors, and lane upgrades
6	Introduce fleet modernization program	Low	High	●	• Waiver on registraton tax, additional rebate on value of old trucks
7	Vary existing road user charges with truck age	Low	High	○	• Mainly policy change and administration costs
8	Strengthen driver training and licensing processes ²	Low	Low	●	• Course modernization and administration
9	Improve fleet through growth-based lending	Medium	Medium	●	• Government may compensate banks for the lower loan rates
10	Set-up cooperatives for owner-operators	Medium	Low	○	• Mainly policy change and administration costs
11	Promote brokerage firms	High	Medium	○	• Mainly policy change and administration costs
12	Increase investment in digital aggregator models	High	Medium	●	• VC funds for start-ups, organization of industry seminars/ fairs
13	Launch an issue resolution app	Medium	Low	●	• Mobile app development, marketing, and maintenance
14	Roll out E-tolling and CCTVs at toll booths	High	Medium	●	• Equipment purchase, IT services, and administration

1. Approximate estimated range of government investments related to the proposed policy
2. Policy impacts road safety and contributes to the overall improvement of the trucking sector

Summary

- The policy options recommended as part of this study target reducing logistics costs and GHG emissions, while improving sector performance.
- The policies are divided across four categories: infrastructure-related, supply-side, demand-side, and process-related. The key policy recommendations include the following:
 - **Infrastructure-related policy options**
 - Reduce congestion around ports through the provision of centralized parking bays and consolidation yards near ports (short-term) and widening of roads, strengthening of roads to handle heavier trucks, lane reservation, and dedicated truck corridors (medium-term).
 - Promote “container-on barges” to boost inland waterway transport (IWT) usage by adopting fleet sizes/designs/waterways suitable for containerization, allocating berthing windows at maritime ports for IWT barges, along with improving container handling facilities at river ports.
 - Promote coastal shipping on the North Vietnam–South Vietnam route by encouraging more coastal shipping lines, domestic shipping centers, reduced port handling costs for domestic cargo, and increased RO-RO vessels that promote trucking–coastal itineraries.
 - Integrate logistics centers and urban consolidation centers (UCCs) in the existing ICD master plan, with logistics centers prioritized at ICD locations closer to industrial zones and UCCs prioritized at the city fringes of Hanoi and HCMC.
 - Prioritize and upgrade the road infrastructure of the eight key routes accounting for a major share of intercity trucking traffic. Elevated roads, overpasses, additional lanes, lane reservations could be explored.
 - **Supply-side policy options**
 - Introduce a truck fleet modernization program with incentives for truck owners to scrap their older vehicles. This could include offering registration tax waivers and scrap value rebates, and encouraging OEM discounts.
 - Vary existing road user charges with fleet age to disincentivize the use of older trucks.
 - Strengthen driver training by adding personal health and safety components and physical tests. Enhance the licensing process through periodic trainings for the

- renewal of licenses. Making a registry of licensed drivers and their driving records available to trucking companies, could also increase the quality of truck drivers.
- Improve Vietnam's fleet through a growth-based lending scheme aimed at preferential lending rates for the purchase of more fuel efficient and larger-sized trucks, subject to company growth, to reduce excessive trucking sector fragmentation.
 - Establish cooperatives for owner-operators to allow the smaller players to pool resources and help them achieve scale efficiencies. Simplify the implementation of regulations specifying minimum assets per trucking company.
- **Demand-side policy options**
 - Promote brokerage firms through defining regulations for the registration of brokers, providing incentives for brokerage firms, allowing 100 percent foreign direct investment (FDI) for successful foreign brokerage firms to set up branches in Vietnam and encouraging cooperatives to create pan-Vietnam brokerages.
 - Increase investments in digital freight aggregator models through government policies promoting fundraising, research and development, FDI, mentorship, and open data sharing.
 - **Process-related policy options**
 - Launch an issue resolution mobile app to report issues faced by a truck driver during his or her trip, such as accidents and informal payments, along with an issue resolution team to resolve the issues.
 - Roll out e-tolling and CCTV cameras at tollbooths along key routes to avoid the unnecessary and unauthorized stopping of trucks, which increases costs and emissions.

These policy interventions are expected to drive the following changes in the sector:

- Reduction in road freight share
- Improvement in truck utilization rates
- Reduction in vehicle ages
- Increase in the average carrying capacity of fleet
- Lower transit times
- Better driving ethics and governance

- The study estimates the successful implementation of these recommended policies could reduce transportation costs by approximately 16 percent, while lowering GHG by approximately 7 percent.
- Other positive impacts of the recommended policy options include reduced pollutants (by about 14 to 16 percent per ton-km), reduced road damage (by approximately 5 percent), reduced number of accidents (by about 10 percent) and reduced forex expenditure (by approximately 7 percent) due to lower required fuel imports thanks to the younger fleet and higher capacity utilization.
- A policy prioritization matrix is proposed to assist policy makers in better understanding the relative costs and benefits of the various policies. The collective impact of the policies is projected to significantly improve Vietnam’s trucking sector, as well as lower logistics costs and GHG emissions.

Notes

1. Costs on a per ton-km basis. Source: Profitability model for truck operators in Vietnam.
2. Saigon Newport Corporation statistics reported in “Transporting Cold Container Cargo by Barge: An Economical Solution,” published in *Vietnam Logistics Review* (date unknown; not available online). More information on Saigon Newport Corporation available at <https://saigonnewport.com.vn>.
3. VINAMARINE (<http://www.vinamarine.gov.vn/Index.aspx>), 2016 data.
4. According to the Spanish ShortSea Promotion Center—SPC Spain: <http://www.shortsea.es/index.php>.
5. Statistic accessed via a financial database of trucking and logistics companies in Vietnam, available to Avention clients.
6. City yellow cars exceeded 85% of the cumulative phase-out. See page 19 in the ICCT white paper, “Review of Beijing’s Comprehensive Motor Vehicle Emission Control Programs,” published in 2015. https://www.theicct.org/sites/default/files/publications/Beijing_Emission_Control_Programs_201511%20.pdf.
7. Based on unpublished 2018 data provided by DRVN.
8. Nationwide trucking company survey with over 110 respondents, conducted as part of this study in 2018.
9. The study-conducted survey records responses of 150 Vietnamese truck drivers across the country
10. See Article 65 of Law No. 23/2008/QH12, on road traffic, approved November 13, 2008, by the National Assembly of Vietnam. <https://thuvienphapluat.vn/van-ban/EN/Giao-thong-Van-tai/Law-No-23-2008-QH12-of-November-13-2008-on-road-traffic/88512/tieng-anh.aspx>.
11. See: <https://vanbanphapluat.co/circular-no-46-2012-tt-bgtvt-on-driver-training-driving-tests-and-issuance-of-driving-licenses>.
12. Results generated by the GHG Model developed for this study (2018).
13. Decree No. 01/NQ-CP dated 01/01/2018

14. Information gathered from the RBI website: <https://www.rbi.org.in/>.
15. Special Drawing Rights = A supplementary foreign-exchange reserve assets defined and maintained by the International Monetary Fund:
<https://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/14/51/Special-Drawing-Right-SDR>.
16. Office of Transportation Cooperatives, Department of Transportation, Republic of Philippines:
<http://otc.gov.ph>.
17. Malaysia Co-operative Societies Commission: <https://www.skm.gov.my/index.php/en/>.
18. Based on findings from of A.T. Kearney global team analysis.
19. Calculated using road freight share of 77 percent in total freight (General Statistics Office of Vietnam) and intercity freight share of 27 percent in total road freight (VITRANSS 2 report, JICA 2010b).

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